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PIONEER BUSINESS AND TECHNICAL JOURNAL OF THE WELDING INDUSTRY

Vol. XXVII June, 1942 No. 6

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The Welding Engineer

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Eastern Representative:
T. E. DEPEW, 1834 Broadway, New York, N.Y.
Tel. Columbus 5-7843

Midwest Representative:
D. R. WATSON, 506 S. Wabash Ave.
Chicago: Tel. Webster 7134

Pacific Coast Representative:
W. R. McINTYRE, 400 East Third St.
Los Angeles, Tel. Michigan 8918

» «

Published on the 1st of each month by The Welding Engineer Publishing Company, 506 South Wabash Ave., Chicago, Ill.

Telephone Webster 7134

Advertising copy must be received not later than the 20th of the preceding month.

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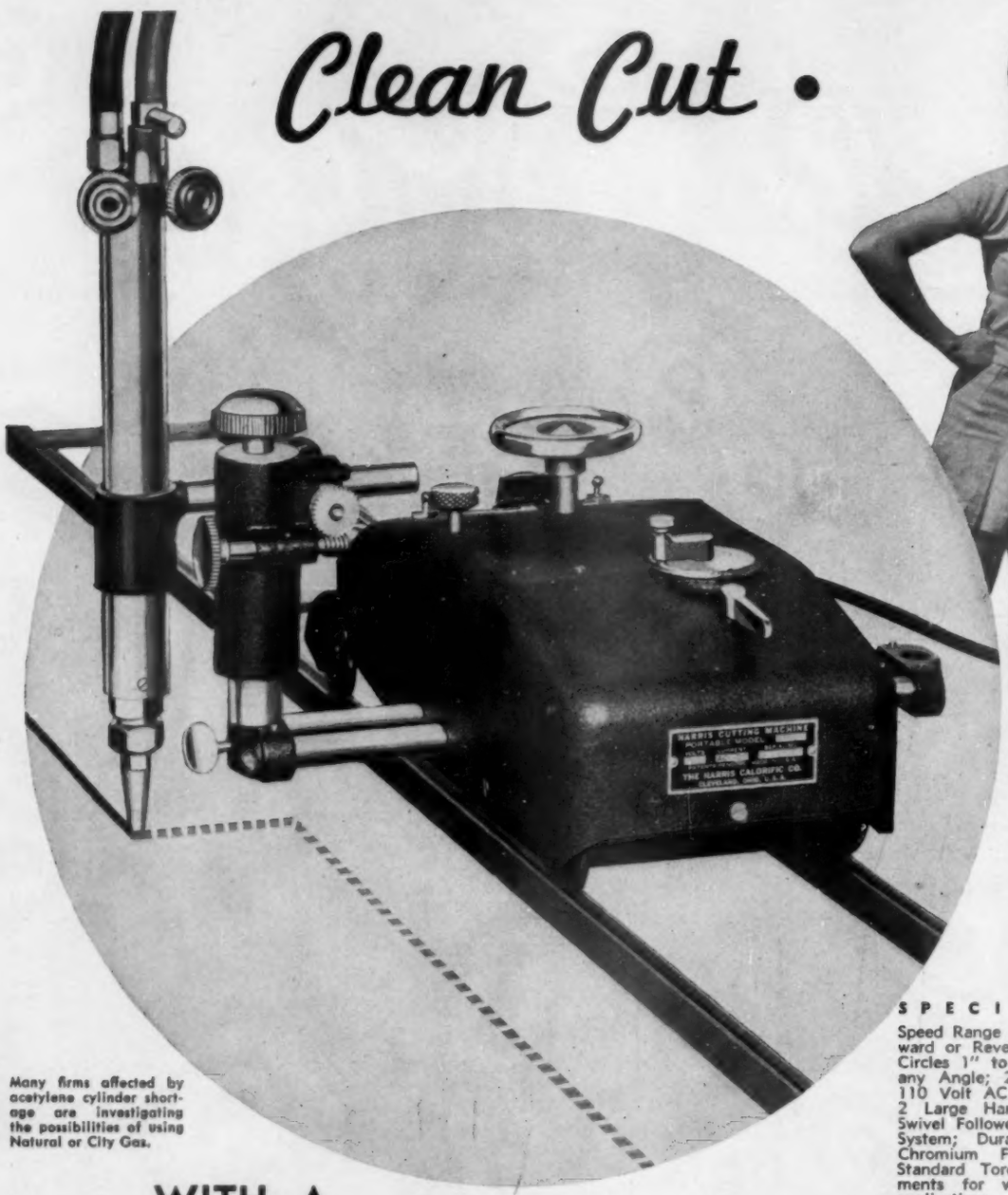
Subscription, payable in advance: United States and possessions, and Canada, $3 a year; Foreign Countries, $4 a year; Single copy, domestic, 35 cents; Single copy, foreign, 35 cents. Entered as second-class matter January 20, 1916, at the postoffice at Chicago, Illinois, under the act of March 3, 1879.

FOREIGN REPRESENTATIVES: AUSTRALIA and NEW ZEALAND—R. Hill, Matlock House, Davenport, Auckland, New Zealand; BRAZIL—Alpha Jewel, Caixa Postal No. 2411, Rio de Janeiro, Brazil; GREAT BRITAIN—A. D. Baynes, 1 Cambridge Park Court, Twickenham, Middlesex, England; SOUTH AFRICA—J. W. Arnison, 35a Victoria Avenue, Benoni Transvaal, South Africa; U. S. S. R.—Mesdunarodnaja Kniga-Kusneszki Most 18, Moscow, U. S. S. R.

Clean Cut •



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The Welding Engineer

AMERICA'S PIONEER WELDING JOURNAL

JUNE 1942

Established 1916

Conservation

We are learning conservation!

For years the American public has been living wastefully in a land of plenty. Six months of war has changed this picture—no longer is there plenty; we must make what we have last.

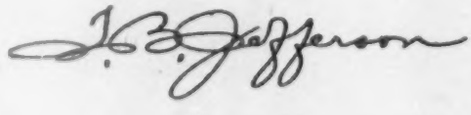
It is difficult to change long standing habits but today's demands make this necessary. The motorist has learned that it is no longer advisable to drive, even a short distance, on a flat tire. The coffee drinker has found that his drink is nearly as good with one teaspoonful of sugar. In one way or another all of us are learning conservation.

The welding processes have long been associated with conservation. Long before welding became America's Number One production tool it was a tool of maintenance and repair. Now that new parts or machines cannot be obtained welding has become even more important as a means of conserving the parts and machines we now have in use.

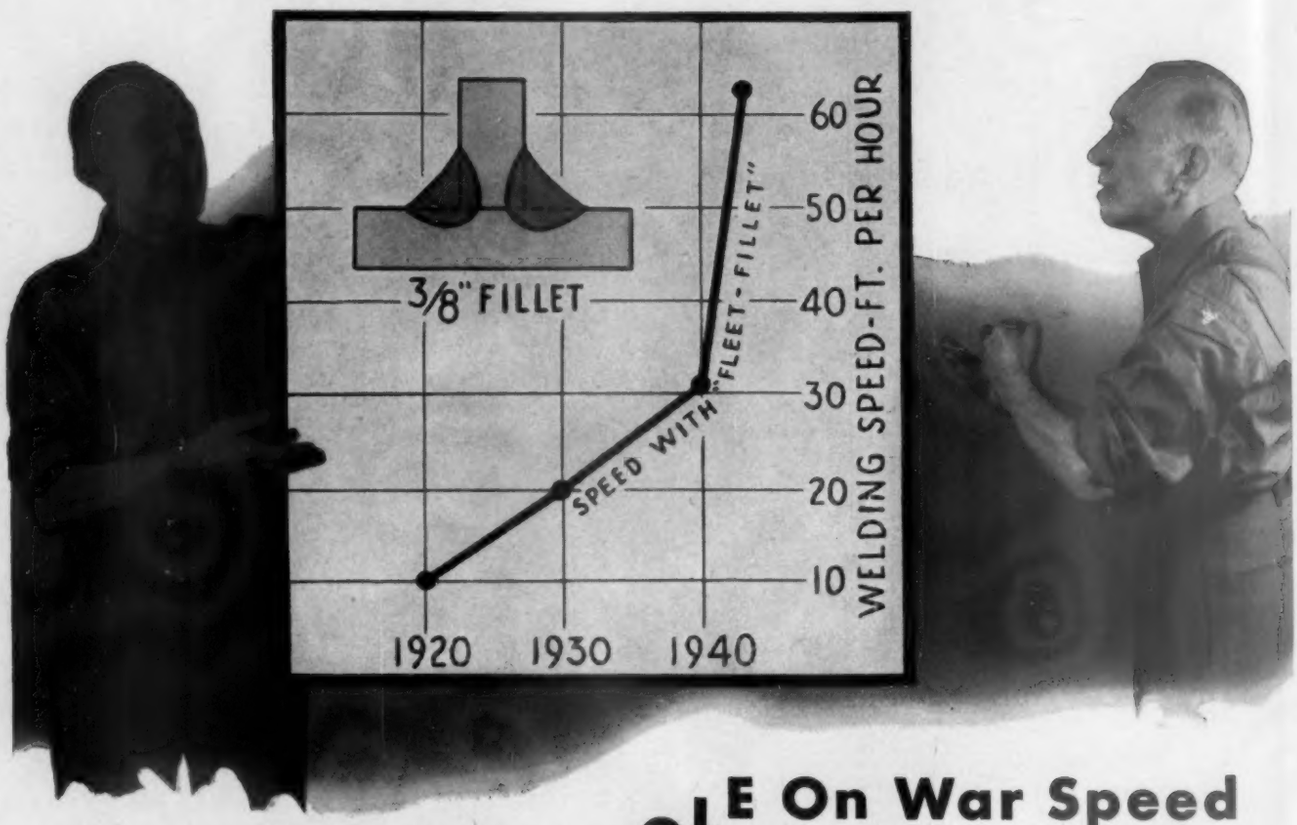
While welding is recognized as our best means of conserving, maintaining and repairing equipment built of metal, many of the users of welding fail to realize that conservation may also be practiced in the welding industry. Elsewhere in this issue it is described how oxygen may be conserved or consumption reduced. Since the demand is greater than the supply any reduction in consumption is equivalent to an increase in production.

Just Remember: There is enough rubber in 100 feet of welding hose to make four 16x6.00 tires; that by burning a 14 in. welding electrode—a $\frac{1}{4}$ in. shorter—2% more weld metal is deposited from the electrode. Neither of these thoughts have meant much to the users of welding in the past but with tires, hose and welding electrodes quite scarce they mean a great deal.

Conservation is saving and saving is a good habit.



then I said to myself—



Here's a NEW ANGLE On War Speed

Look how war industries can step up welding output with the new "Fleet-Fillet" Technique!

ALTER EGO: Looks like arc speeds of 30 feet per hour have been increased to 65 feet per hour for a ⅜" fillet overnight. That's more than 100 percent. How could it be possible?

According to Lincoln it's simply a matter of selecting the right electrode, using the new "Fleet-Fillet" Technique and going like blazes.

ALTER EGO: But isn't that speed tough on the "Man Behind the Mask"?

Not at all. In fact, many welders who have tried this new technique say it actually is easier — causes less fatigue than the old way!

ALTER EGO: Then every American—from the welder to the president—should go for it! Let's see the details in Lincoln's new bulletin "The Fleet-Fillet Technique For Speeding War Production and Cutting Costs." And let's put it to work for Uncle Sam without delay.

"Fleet-Fillet" Bulletin 432 free on request.

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ALTER EGO: Literally, "one's other self"—the still, small voice that questions, inspires and corrects our conscious action.

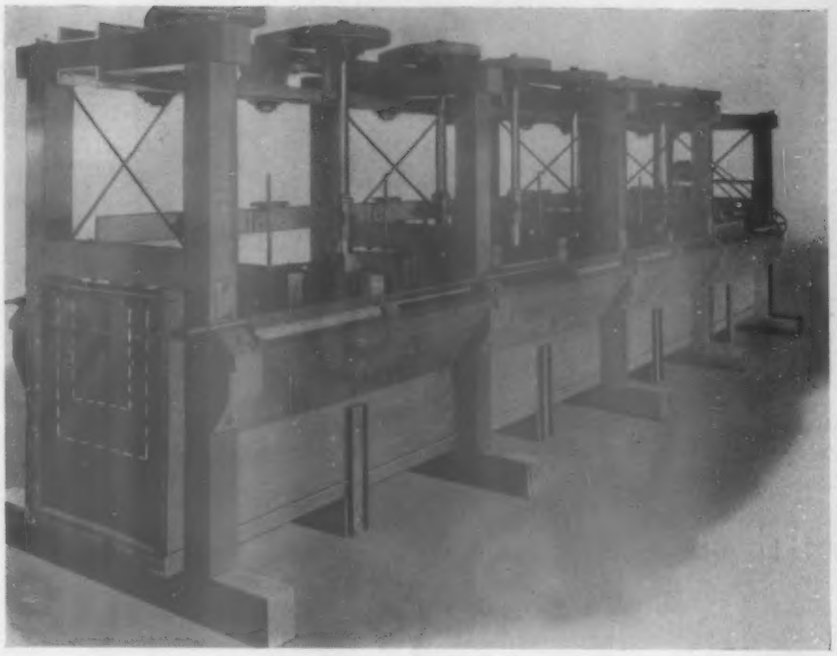


Fig. 1.—The original high-head type flotation machine of wood construction.

Welded Mine Flotation Equipment

By **ASHER H. PATTEN**
Chief Engineer
Denver Equipment Co.

Changing the design of mine flotation was accomplished in logical steps. These intermediate changes and the reasons for their adoption are given

THE PRIMARY cause for the introduction of steel tank construction into flotation cells, in place of wood, is to cut costs of construction. Nearly a dozen other items however were instrumental in bringing about a modified design of parts and the complete redesign of the flotation cell tanks.

The original high-head wood flotation machine, as constructed by the company, was designed with the idea of combining all of the best qualities of all flotation machines minus, of course, their various and many imperfections. It is not my desire to discuss the mechanical construction details of the agitating mechanism, "V" belt drive, or shaft assemblies, but rather to show the improvements made in tank construction down through the last several years. To correctly illustrate these improvements it will be necessary to give a brief description of the various types of machines and their tanks.

Original Design

Fig. 1 clearly indicates the various parts as were originally built into the high-head type of cells. On a six-cell machine, four large wood bents were required. This construction required six mortise and tenon joints for each bent. These bents, each of which weigh 250 lbs., a total of 1000 lbs. for a six-cell machine, were used only to carry the tank and the bearing support channels.

The tank itself consists of the following lumber:

11 pieces 2 in. thick x 20 ft. long.
4 pieces 3 in. thick x 20 ft. long.

All these boards had to be cut with splines as clearly indicated in Fig. 1. In addition there were also many small blocks and wooden parts required for the tank. All of these parts were milled and assembled in the shop then, when correctly marked, torn down and crated. After being received at their destination the machines were uncrated and reassembled. Special note should be made of the extra heavy tank lumber, heavy wood bents, as well as of all of the brace rods, small wood blocks and the numerous other parts, which are clearly shown throughout the series of pictures.

This type of machine was redesigned in 1932 and a low-head steel bent machine was introduced. This construction was exactly identical as far as the tank itself was concerned but the change was effected by changing to "H" beam and channel bents. While this redesign did not greatly reduce the weight it had the distinct advantage of reducing the floor space covered by the ma-

Fig. 2 — Improved low-head steel bent flotation machine of partially arc welded construction.

chine as well as the head room required.

The steel bents did not have to be crated for shipment, this was a decided advantage over the wood bent construction which was so bulky and required lots of crating. The cost of the shaft assemblies was also reduced since the shafting required for a six cell machine was reduced by 13 ft. 1 in. It was also possible to design a one piece unit spindle bearing that was more satisfactory than the two separate bearings previously used. In this change the housing carried both the upper and lower SKF ball bearings. This feature was not practical on the high-head type machine due to the long distance between bearings. The one piece housing also had the added advantage of being lower in first cost than the two piece bearings.

Weight Saving

The new steel low-head bents had a weight of 318 lbs., but by the use of suitable jigs and fixtures during assembly they could be erected at an actual reduction in cost over the original high-head wooden bents. The changes in bent and bearing design resulted in a saving in weight of 2400 lbs. between the original high-head and the new design of the low-head steel bent machine. This weight saving was of course directly responsible for a considerable reduction in construction cost, as well as freight cost paid by the customer.

The design and construction of this low-head steel bent is clearly indicated in Fig. 2. Particular note should be made of the rivets on the bottom and tops of the bents. These rivets were only employed for a short length of time and were replaced by welding the top and bottom channels to the vertical "H" beam. On careful inspection of the photograph the tack welding employed for holding the parts in correct place while riveting can be detected. The channels are carried on the steel bents. Also the motor brackets and supports for the gate handwheels are welded.

A further change in construction was made during the year 1934. This change was imperative because competition was offering a machine of lighter construction. Also, there was downward trend in prices at this time. Due to the much lighter construction the competitive trade were able to sell their machine at a lower price, so naturally it was found advisable to make the changes necessary to result in further cost reductions to meet competition.

Economies Effected

The machine that was developed was not changed as far as the wearing parts (cell liners or parts that give additional life or wearing time) were concerned. All these parts were retained as interchangeable with previous machines. The tank, however, was changed from one of wood construction to all-steel type and welded continuously inside and outside. The large steel channel and "H" beam bents were entirely eliminated since they were not necessary to the all-welded construction. The new design immediately met with the instant approval of the mining industry, and a popular flotation machine became even more popular. This new type design was termed "The Economy Type" and some indication of the economy effected can be obtained from the following facts:

(1) The head room or overall height was reduced by an additional nine inches. This at once resulted in a saving of 4 ft. 6 in. of cold rolled and ground shafting and reduced somewhat the cost of machining this shafting.

(2) The elimination of the steel bents (4 in all on a 6 cell machine) weighing 318 lbs. each. This saving in weight was two fold as it meant a saving in the construction cost of the machine, as well as a saving in the assembly time both to our shop and to the customer. The elimination of the bents so greatly reduced the assembly time that it was easily possible to completely erect and put into operation a six cell machine in as little as six hrs. This was in evidence in both our assembly shop and also in the mill in which the machine was to be put into operation. The exact value to the customer in dollars and cents cannot of course, be determined.

(3) The overall floor space was considerably reduced resulting in further economy in space requirements. The actual space saved was 11 sq. ft., or sufficient room for almost an additional cell of the same size.

(4) The greatest saving was obtained by the reduction of weight (not of the vital wearing parts). This saving in weight was found to be 3000 lbs. for a six-cell machine over the low-head steel bent machine and 5400 lbs. over the original high-head wood tank machine. It should again be noticed that while this great saving in weight was being effected that the working parts of the cell which produce correct metallurgical results remained un-altered. No reduction in weight was made

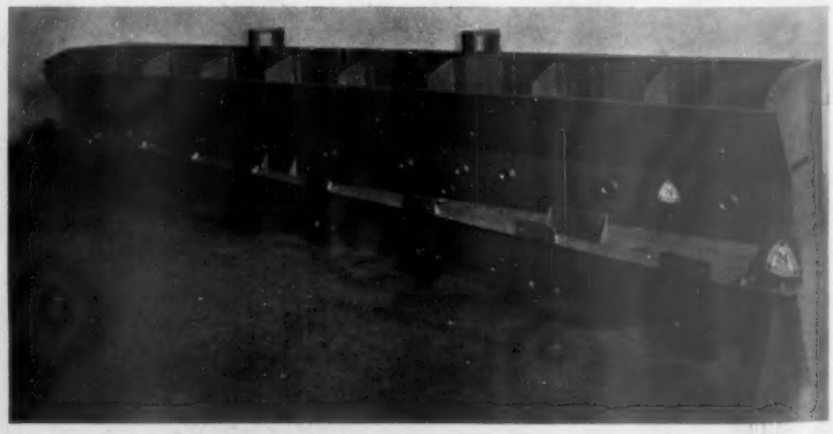


Fig. 3—Construction of tank and steel frame of the "Economy Type" flotation machine of all welded construction representing a weight saving of 5400 pounds over the original high-head wood tank machine.

in the wearing parts. This weight saving on the price of steel alone amounts to about $100 and this amount does not include fabrication or freight.

Welded Construction

Fig. 3 indicates the construction of the tank and the steel "A" frame. This "A" frame which supports the motors and spindle bearings was fabricated from a "CB" section with plate gussets welded on each end. This type construction had a weight of 550 lbs. and it was used to replace two large channels that had a combined weight of 690 lbs. A resultant saving on this item of 140 lbs. of steel, could not have been made without the aid of arc welding.

The all steel tanks of the "Economy Type" machine are designed for construction from standard size heavy steel sheets. The material used consists of five pieces, back, bottom, front and the two ends. These pieces are built into a solid and rigid tank as follows, the bottom plate was flanged on both edges for its entire length. The back plate is set down inside of the flange and lightly tack welded into place. The front plate which has previously been formed or bent to form the spitz and spitz lip is then set down inside of the other flange on the bottom plate. This plate is also tack welded lightly into place. Several small specially designed screw jacks are then set on the bottom plate and screwed out pressing the front and back plates tightly against the flange of the bottom plate. Six-inch steel channels (formally bolted into the wood tank machine) forming the partitions are then formed and set into place and lightly tack welded. Across the tops of the partition channels there are set heavy steel pipe spacers which hold the tank to the correct top width. The bottom is held to size correctly by the small screw jacks and the flanged bottom plate. The pipe spacers are welded into place and after the complete tank is fabricated they are removed by flame cutting. The common known method of ship welding on one tank at several dif- the welding of all tanks. It is quite common for several operators to be welding is necessarily employed in ferent places at the same time.

Fabrication Problems

On the size tank under discussion there is approximately 250 ft. of welding. On some of the tanks which have been recently constructed there is as much as 1000 ft.

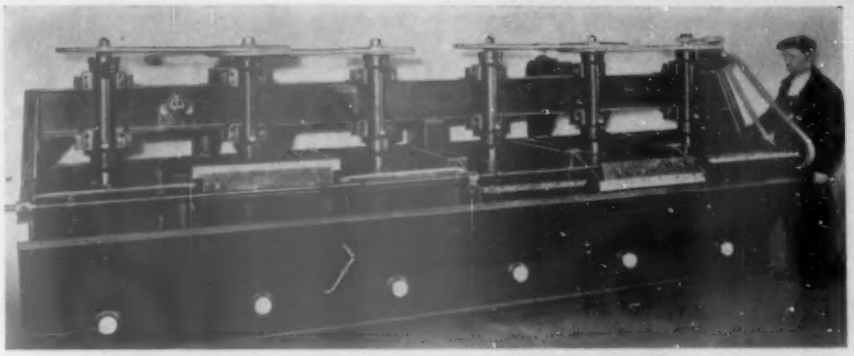


Fig. 4—Completed "Economy Type" flotation machine illustrated in Fig. 3.

The problems encountered were numerous but the main one was in the difficulty found in preventing warpage and in holding the tank to its correct size and shape. These troubles were overcome by the use of jacks and pipe spacers as mentioned above. Additional warpage was controlled by using skip welding and by having the operators watch carefully to avoid welding too much at one spot at one time. The completed "Economy Machine" is shown in Fig. 4. Special attention is called to the height of the machine and also to the straightness of the tank and "A" frame.

Compactness Desired

On foreign shipment the volume rather than the weight is the determining factor in shipment. For this reason it was found necessary to develop a machine that was especially adaptable to foreign shipment. This required that a machine be designed to incorporate all the good features of the Denver "Sub-A" yet at the same time possess the compactness required for foreign shipment. Consequently it was necessary to develop some method of revised construction that would result in a reduction of number of pieces as well as in the cubic content of the various pieces.

The design of a unit to permit the ease of shipment necessary was conceived in 1937. This unit, to become known as the Denver "Sub-A" Twin Unit, was first completed about mid year of 1937. It instantly met with the approval of the foreign market and even in the domestic market was so well received that numerous Twin Units were sold in the States. The operators realized immediately the ease with which this unit could be shipped and installed as well as put into operation. The man in the field found numerous applications for the unit that had not even reached the minds of the office engineering department.

The Twin Unit in itself was a radical departure from the previous type construction. But again no changes were made in the internal rotating or wearing parts that were so vital a part of thousands of machines or cells that were already in operation.

The main item that was kept constantly in mind during design was that the unit must be compact and easily shipable. The tank was therefore designed of all-welded construction as such construction was certainly most suitable for strength together with lightness and compactness. The tank was built so that it could be used as a crate, and was built in two cell units. Thus the name Twin Cell. The reason that two cells were selected as the best size was two fold, first the shaft length necessarily used could be packed in the cell, and second the drive was readily suitable to a dual drive or twin drive. One motor driving two cells.

Self-contained Crating

When the machine was made ready for shipment all parts required on a two cell machine were packed in the tank of the two cells. The "A" frame was designed of welded parts that could be turned over into the tank and hung down inside of the tank during shipping. In fact, all parts were placed inside of the tank and blocked into place to prevent shifting. The top of the tank is then covered with two inch planking, which is bolted to the tank using holes that have been provided for this purpose, to make a closed crate.

When a six cell machine was ready for shipment it consisted of three boxes or rather three welded steel crates each with a wooden cover and each containing all the parts necessary for its assembly.

These units were so designed as to provide for coupling one unit to the next by use of a flexible rubber coupling or hose. The customer could purchase a bank of three of the twin

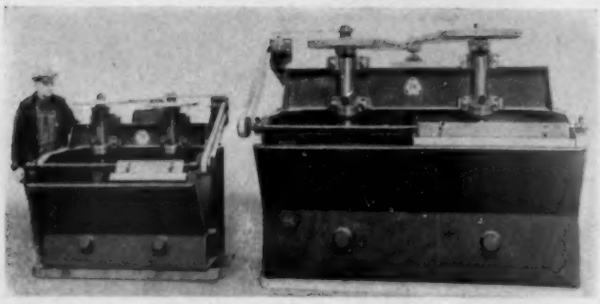


Fig. 5—"Twin Unit" flotation machine of all welded construction designed especially to reduce weight and furnish a compact unit for shipment to foreign countries.

units and at any time add another unit or even more if desired. This feature has proved to be very beneficial, the additional cells being used to take care of increased tonnages or even for selective flotation of different products.

Welding Advantages

The actual construction of the twin unit would not have been at all practical if it had not been for electric welding. The tank is constructed of six pieces. The front, back and bottom, then the two ends are constructed in exactly the same manner as was the "Economy" machine. But the center plate had to be redesigned to allow the "A" frame to drop down into the tank. The shaft height also had to be shortened to allow for packing it in the tank. This meant a slight change in the construction of the "A" frame and also new bearing housings. These bearing housings were not changed in size except for the length. The length necessarily had to be shortened due to shortening the shafts to make them fit into the tank. By this change an additional 3 ft. 6 in. of shafting was saved on a six cell machine.

Several items of particular note are here mentioned to show or indicate some idea of the vast and important part that arc welding plays in the construction of Twin Flotation Cells. Fig. 5 shows additional features of the Twin Units and clearly indicates the vast field for the application of arc welding in their construction. Fig. 6 shows three two-cell units ready for foreign shipment. All parts are in the tank and ready for immediate assembly when received. These three steel crates have replaced about 20 wood boxes.

Customers' Savings

The many savings effected both to the company and to their customers, are all due directly to the welding. Without arc welding continual improvements could not have been made and the gradual lowering of the cost to the consumer would not have been possible. The many savings to the customers both in shipping and in assembly time were also all made possible by welded steel construction.

All of the savings were accomplished without sacrificing any of the operating results which were designed into the original machine several years ago. Surely all of these added advantages could not have been obtained with any other type of design.

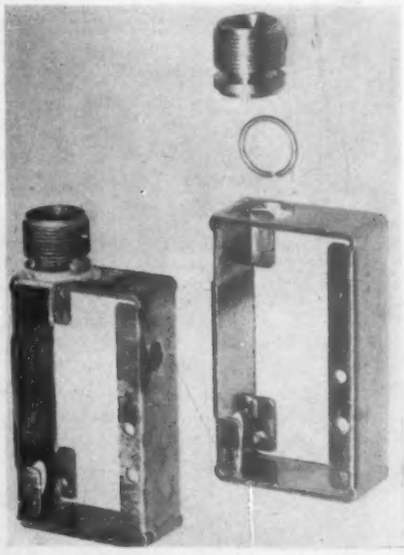
* This article and illustrations is from data submitted to the James F. Lincoln Arc Welding Foundation during a recent award program. Its current $200,000 Industrial Progress Award Program closes June 1, 1942, offering 458 awards for reports of advances and improvements made by application of arc welding in design, manufacture, fabrication, construction and maintenance.

Fig. 6 — Three two-cell units packed ready for foreign shipment. These 3 steel crates have replaced about 20 wood boxes which were necessary in shipment of the former type of machine.

Silver Brazed Housings

Silver brazing alloys are helping materially to speed up our war production in a big majority of metal working plants. One instance is the Micro Switch housing shown in Fig. 1. The steel stud fitted into the steel box was formerly brazed with a high melting point base metal alloy; then, after grinding off excess alloy and cleaning, the assembly was cadmium plated.

At present the base metal brazing alloy has been discontinued in favor of a low temperature silver brazing alloy. Production immediately increased to 3 times the former rate—from 500 per day to 1500 per day. This not only meant faster deliveries to vital war industries, but also permitted an actual reduction in the price of the switch. The brazing procedure is simple and no radical design change was necessary. After the parts are cleaned and fluxed, a ring of brazing alloy is placed between the stud and the box. The assembly is then heated in a gas fired furnace. At 1175 F. the silver alloy ring melts and flows between the parts, forming a leaktight joint, stronger than any previous method of joining the two parts.



Handy & Harman Photo.

Fig. 1—(Right) Silver alloy ring ready for placing between stud and box. (Left) After heating to 1175 F. the ring has melted and penetrated through parts. Fast heating, low brazing temperature and elimination of grinding increased production 300% over former method.

The manufacturer discovered two other advantages. By low temperature silver alloy brazing, no grinding is necessary after brazing and the joints remain leak-tight, even when replating is necessary. Formerly, when removing the cadmium, then replating, the joint became porous. Now, joining the parts with the silver brazing alloy, this porosity does not occur. The Micro Switches are all used for war materials, mostly aircraft.

» «

The job shop weldor can help win the war by conserving welding electrodes, rods and gases.

Fig. 1—Each tank is tested under oil pressure far in excess of normal to check for minute leaks.

Welding Transformer Tanks

Seam and projector welding are used extensively in the manufacture of leak-free transformer tanks. The four phases of production are discussed.

RESISTANCE WELDING methods are making it possible to build round tank distribution transformers at the rate of 40 per hour in the Pittsburgh Transformer plant of the Allis-Chalmers Co. High speed production of this nature has been made possible by the use of the latest in welding and metal working equipment, producing rust-proof, leak-proof, pressure welding tanks fabricated from copper-bearing steel sheet. These transformer tanks, which are built on an assembly line basis, are suitable for use with various sizes of transformers up to those rated at 25 kva.

The straight line production methods of this modern plant are the result of material flow in the fabrication of pocket bushing type transformers somewhat in the following manner: Shearing of sheets; punching; rolling; welding; flanging; final welding and testing.

Shearing and punching. The first operation on the round tank transformer production line is that of shearing the copper-bearing steel sheets to the required dimensions for the specific size transformer in production. Following the shearing, the sheet is moved to a punch press. At this location the tank pocket outlets are punched. The sheared and punched sheet is now ready for the forming rolls.

Seam Welding

Welding. After having been rolled to the correct size, the sheet is then ready to be welded to form a tank shell. Welding is carried on in two operations in this stage. The side seams are first tack welded by a series of spot welds, after which the seams are ready for continuous welding in a seam welder. This is an automatic resistance welding operation to insure permanent protection against leaks. The seam welders (Fig. 2) employed in this operation are of various kva. capacity. Irrespective of size all are fitted with electronic controls for welding current control and pneumatic controls for the control of welding pressures so as to assure uniform welds. When welding currents and pressures are controlled in this manner there is little likelihood of error due to the human element. At the same time there is a resultant increase in efficiency and production.

The round tank with its welded, vertical seam is now taken in to another spot welder so that the pocket may be tack welded in place. Following the tacking operations, the tank is moved to another resistance welding machine. This unit, a short neck seam welder having the electrode rolls set transverse to the machine, is used to seam weld the bushing pockets in place. Naturally if the transformer is not of the pocket bushing type, this step is omitted. Pockets on the pocket bushing type transformer are formed from deep drawing steel.

Fig. 2—Round tanks of durable copper-bearing steel are automatically seam-welded at the side to insure permanent protection against leaks. This operation takes place after shearing, punching and rolling of the tanks.

Seam welding in the installation of these pockets again affords the most satisfactory means of obtaining an oil tight joint which in no way weakens the tank wall.

Bottom Construction

The tank is now ready for the installation of the bottom. Tank bottoms of copper bearing sheets are sheared and flanged prior to the coming to the transformer tank production line. After the bottom has been placed in the tank shell, in a recessed position as protection against mechanical damage and handling, it is completely welded in place (Fig. 3).

When the bottom has been welded in place two lips are rolled on the tank simultaneously. The bottom lip, which forms a stiff, smooth bearing surface, is rolled inward as indicated in Fig. 4. The lip is rolled outward to provide a smooth, broad seat for the cover gasket.

Projection Welding

The tank is now ready for further punching operations, that of making openings for the low voltage bushing outlets. To each of these outlets, three in number, there is projection welded a small ring. Projection welding of these rings in place is greatly expedited by the use of a special sliding fixture resistance welder designed with two electrode dies. The operator welds one ring in place and as he rotates the tank the other welding die comes into position to weld the next ring. By the alternate use of these two welding dies the temperature of each die is held at a minimum thus adding greatly to the life of the die without affecting the efficiency of the welding machine.

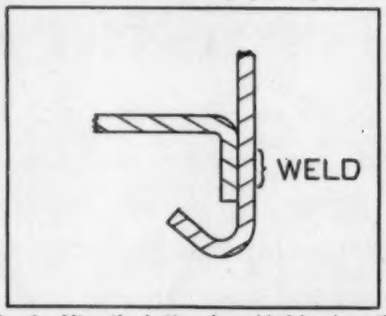


Fig. 4—After the bottom is welded in place the shell is rolled inward.

Fig. 3—The bottom is seam-welded. Recessing of tank bottoms provides additional protection against rusting and mechanical damage in handling.

Accessories Installed

All of the accessories required to complete the tank are welded in place. This includes tank hardware, lifting lugs, ground studs and name plate holders. Spot and projection welding are used for these miscellaneous welding operations. As in the case of all previous welding operations, the machines used on these apparently less important welding operations are also automatically controlled. Thus, the operator cannot make faulty welds by using too much or too little welding current during any of the welding operations involved in the construction of a distribution transformer tank.

Pressure Testing

Testing. When the welding operations have been completed each tank is taken to a test rack for a testing under oil pressure (Figure 1). During this test the tank is subjected to pressures which far exceed the normal pressure encountered in service. Consequently, any minute leak that might not otherwise appear is brought to the surface. No tank is taken from the test rack until it is proved leak-free. Since this practice of testing tanks was introduced Allis-Chalmers has not had a complaint of a leaky distribution transformer tank having ever been received by a customer. Every tank after it is taken from the testing rack is ready for finishing.

Finishing. The first step in a finishing operation is that of rust proofing the tank. This is a operating process

(*Continued on page 48*)

Short Span Trusses with Tubular Members

Tubing simplifies design, conserves material and is ideally suited for welding. In welded truss design it may be combined advantageously with structural shapes.

By **F. A. WEITZEL**

IN THE MAY 1941 issue of *The Welding Engineer* the writer contributed a study of welded pipe truss construction. In this study, the design of the welded trusses was persistently carried through under the limitation of using pipe sections throughout. The article pointed out the advantages of welded trusses made from standard pipe as compared with riveted trusses made from rolled structural shapes. For the purpose of avoiding repetition, no attempt will be made to present in detail the advantages of the round tube section over the rolled structural shapes. The purpose is rather to carry the idea of weight saving still further by making use of steel tubing in design instead of ordinary pipe.

Tubular Members

In selecting truss members from the three weights of standard pipe one is frequently forced to choose a pipe of a much greater cross section area than is required. This is especially the case with rather long compression members which are subjected to comparatively little stress. A certain minimum radius of gyration is mandatory, but as to the wall thickness of the pipe, we have to make the best of what is available. With truss members of this kind a lesser wall thickness would even result in a twofold advantage as the radius of gyration of a ring-shaped cross section increases when the cross section area decreases and the outside diameter remains constant. For example, a double extra-strong pipe of 2⅞" O.D. with a well thickness of .552 inches has a radius of gyration r = .84 inches; whereas a tube of the same outside diameter and .049 inches wall thickness has a radius of gyration of r = .9994 inches.

It is in instances as mentioned above that a product, which at present is still little known in the structural engineering profession, shows extremely desirable properties; that is the welded tube.

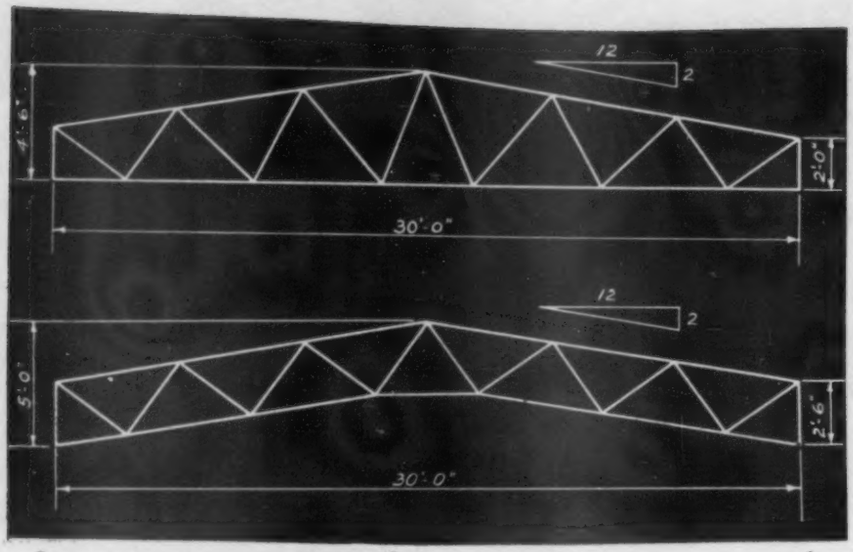
One advantage which is immediately apparent when the designing engineer starts his investigation of tubing is the greatly increased variety of dimensions, both in diameter and in wall thickness. This gives him an opportunity to select sections which are more nearly ideal for his purpose when the loads on various members of a structure have been calculated. It is particularly important that he has at his disposal a large number of sizes which have a much lower wall thickness than is available in any standard pipe size. This is due to a large extent to the important improvements which have been made in the manufacture of welded steel tubing during the past decade. The perfection of equipment for forming steel tubing from strip of the desired thickness has resulted in a product that is uniformly dependable from an engineering standpoint and considerably lower in cost than was possible before the tube welding procedures had been fully developed. The designer will find that in many cases there is available a tube with almost exactly the section characteristics desired.

Another advantage of the tubing is that since in many cases the wall thickness is comparatively small, the fabricator will find that the material is easier to cut, bend, flatten, etc., and also easier to weld.

Structural Advantages

There is a structural advantage in the steel tubing in that the material itself is of better structural quality. This is because higher percentages of phosphorus and sulphur are allowable in material in which threads have to be cut, whereas the lower allowable contents of these elements in the strip material give better physical properties as well as better welding quality. Further, it should not be overlooked that with the thinner walled tubing such operations as cutting, bending, flattening and welding can be accomplished with simpler tools and with less power; and, especially with light trusses, very simple and rather inexpensive panel point connections become possible.

It would require a very lengthy investigation and the development of a large number of truss designs in order to determine just what type of truss using steel tube members could be most economically fabricated. The present study is confined to four different types of trusses. These are all illustrated in Figure 1, 2, 3 and 4. One basic feature of all of these trusses is the use of T-sections for both upper and lower chord members. Another feature of the design is the use of a single piece of steel tubing for a continuous web member in each truss. This is accomplished by flattening the tube in the areas where it will intersect chord members at panel points and slotting these flattened areas so that they will fit over the stem of the chord when the tube is bent as indicated in the various truss designs. (See Fig. 5a, b and c.) It is also proposed to form the chord members by splitting I-beams diagonally. Figure 6 illustrates in a few examples the splitting of I-beams and the arrangement of the resulting Tee's for truss chords. This provides a tapered member for each chord, the taper being disposed in each case in such a manner as to proportion the cross section area to the varying stress magnitudes between panel points. For example, the



Trusses for 20 ft. span, 40 psf. live and dead load.

Fig. 1—(Upper) Truss weight 788 lbs., or 1.3 psf. of roof area. Top chord ½-6 CB 20; bottom chord ½-6 CB 15.5; diagnosis 3 in. O.D., 8 ga. tube.

Fig. 2—(Lower) Truss weight 915 lbs. or 1.53 psf. of roof area. Top chord ½-8 CB 27; bottom chord ½-6 CB 20; diagnosis 3 in. O.D., 8 ga. tube.

wide ends of the tapered members would be used at the eaves in truss No. 4 and the narrow end would be used at the ridge joint. (See Fig. No. 7.)

Some advantages are thought to be inherent in this design. For one thing, it results in having only one piece or possibly two pieces to handle for the entire web of each truss. The metal is so disposed by this method of flattening that it provides a good lateral stiffness at each panel point. The flattening and slotting are simple operations which can readily be produced at low cost on a mass production basis.

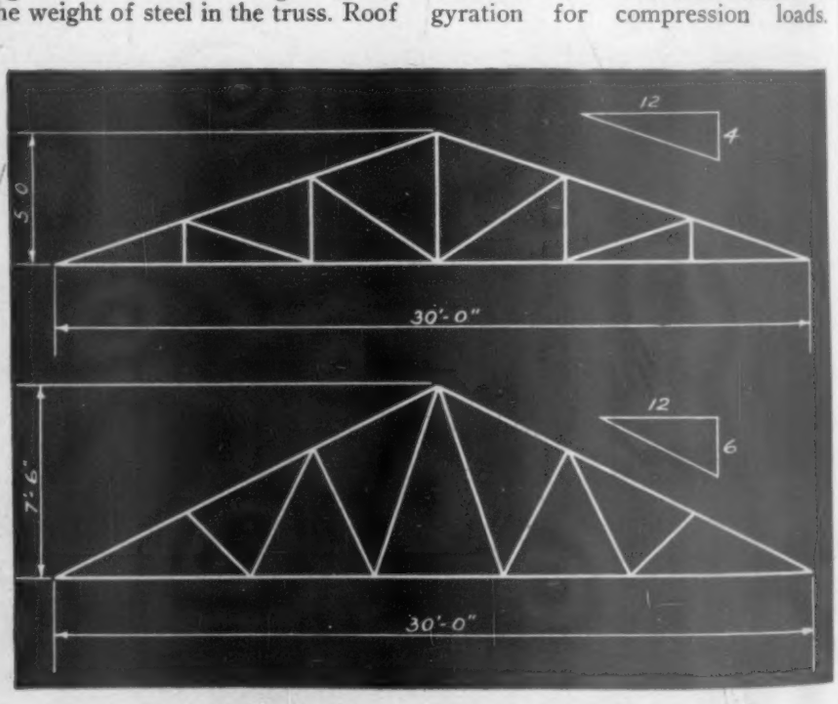
Several variations of this general design are both possible and permissible. It might be advantageous to use shorter lengths of tubing and use more than one size in a single truss. This, of course, would reduce the weight of the truss because in all of the designs shown it has been necessary to use the maximum size throughout. Changes of this character would not add appreciably to the fabricating cost because only a very few more operations would be necessary and the amount of welding would not be appreciably increased. Whether continuous, bent web members of uniform size or individual lengths of tubing of varying sizes are more advantageous cannot be stated generally, as the number of trusses to be fabricated, the set-up of jigs, and the cost of tubing and handling must be considered in each case.

A definite cost analysis of any of these proposed trusses as compared with a conventional truss of riveted design has not been attempted. The cost of structural shapes is usually figured on a pound basis and the cost of welded tubing is customarily figured by the foot and it appears to vary according to dimensions of the tube and not by any definite rule.

Although there is no actual case at hand with specific conditions as to number of trusses involved, type and equipment of shop, etc., which would form a fair basis for arriving at construction costs, it can readily be shown that the proposed design promises a slight material cost saving in addition to saving 40% of the weight of steel in the truss. Roof trusses of riveted construction similar to those given in Fig. 1 to 4 are usually assumed to weigh from 2 to 3 lbs. per square foot of roof area covered. Let us assume a price of $44 per ton on structural shapes and an average weight for the truss of 2.5 lbs. per square foot of roof area. The average weight of the four trusses in Fig. 1 to 4 is 890 lbs. of which 700 lbs. is structural steel and 190 lbs. tubing. The average weight of conventional riveted trusses equivalent to the proposed trusses is 1505 lbs. An analysis of the material cost saving is given in Table I. It seems safe to say that there is a good probability for a shop which is familiar with and efficiently equipped for this kind of welding work to compete with or even to underbid work done after the conventional riveting method. Incidental savings, due to the elimination of small connecting pieces to be cut, punched and handled, and to the probable 50% savings in painting, could be expected to make this method of truss construction more economical, in addition to very desirable in conservation of steel.

Design Characteristics

It is impossible in a brief study to make a complete comparison between the structural properties of the steel tube sections and other shapes. The tube section is, of course, at its greatest advantage when it is used in a compression member because it has the most favorable radius of gyration for compression loads.



Trusses for 20 ft. span, 40 psf. live and dead load.

Fig. 3—(Upper) Truss weight 956 lbs. or 1.6 psf. of roof area. Top chord ½-8 CB 33; bottom chord ½-8 CB 19; diagonals 2⅛ in. O.D., 10 ga. tube.

Fig. 4 (Lower) Truss weight 907 lbs. or 1.5 psf. of roof area. Top chord ½-6 CB 30; bottom chord ½-8 CB 17; diagonals 2¼ in. O.D., 9 ga. tube.

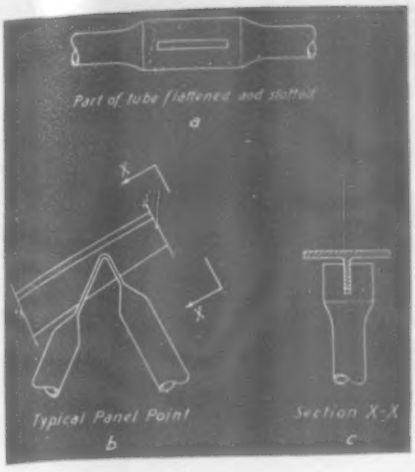


Fig. 5—Truss diagonals are formed by flattening and slotting tubing.

Table I—Material Cost Analysis

Weight of conventional riveted truss	1505 lbs.
Weight of welded truss with tubular web	890 lbs.
Total weight saved	615 lbs.
Weight of structural shapes saved	805 lbs.
Percentage weight saving in trusses	40%
Weight of tubing	190 lbs.
Cost of tubing at 6.5 cents per lb	$12.35
Cost of structural shapes saving at 2.2 cents per lb	$17.71
Material cost saving per truss	$ 5.36

Table II—Section Characteristics

Comparative Section Characteristics for Tubing, Standard Pipe and Structural Shapes of Nearest Cross Sectional Area

Section	Area Sq. In.	Wt. Lbs. per Ft.	Mom. of Inertia	Section Modulus	Radius of Gyration
3″ x 8 ga. round tube	1.47	5.0	1.41	.99	1.00
2″ extra strong pipe	1.48	5.02	.87	.73	.77
3″ x 2⅜″ I-Beam	1.64	5.7	(2.5 (.46	(1.70 (.40	(1.23 (.53
3″ x 1½″ channel	1.46	5.0	(1.8 (.25	(1.2 (.24	(1.12 (.41
2½″ x 2½″ x ⅛″ angle	1.47	5.0	.85	.48	.76[1]
3″ x 3″ x ¼″ angle	1.44	4.9	1.2	.58	.93[2]
2¼″ x 2¼″ Tee	1.43	4.9	(.65 (.33	(.41 (.29	(.67 (.48

1. least r=.49, 2. least r=.59.

However, as a matter of interest, Table II has been prepared to show how the tube designated as the web member for truss No. 1, that is a 3 in. dia., 8 ga. tube, compares with the nearest standard pipe sizes and several different structural shapes.

An important difference between the trusses illustrated in Figs. 1 to 4 and the pipe trusses which were described in the earlier article in *The Welding Engineer* is that in the present case rolled structural shapes are used for chord members. This is done because it is definitely known that the cost of tube per pound is considerably higher than the cost of structural shapes per pound, and also that the difference in the material cost for a truss may in some cases not be enough to compensate for this increased cost per pound. It is very important to consider that the customer is not buying trusses; he is buying a complete building and a true picture of the possible economies realized by using tubular construction can only be obtained by determining the effect upon the total cost of the building in which the truss is to be used. Therefore, the use of steel tubing in combination with some rolled shapes may prove to be the most economical, even though the design does not involve the utmost saving in weight which might be accomplished. In the first place, the present design provides some economy of material by providing a tapered section for chord members. Secondly, the joint design suggested makes a simple and economical assembly for plant fabrication and thirdly, the flange of the Tee of the upper chord provides for a simpler and cheaper purlin connection than can be provided if a tube is used for the upper chord.

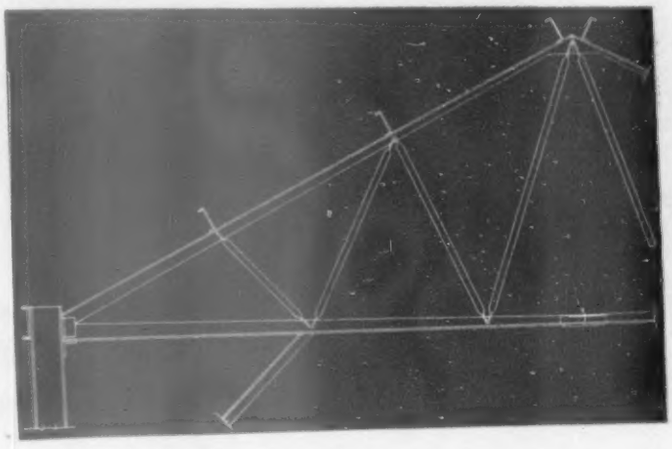


Fig. 7—Chord members are tapered to vary their cross-sectional area to the varying stress magnitudes.

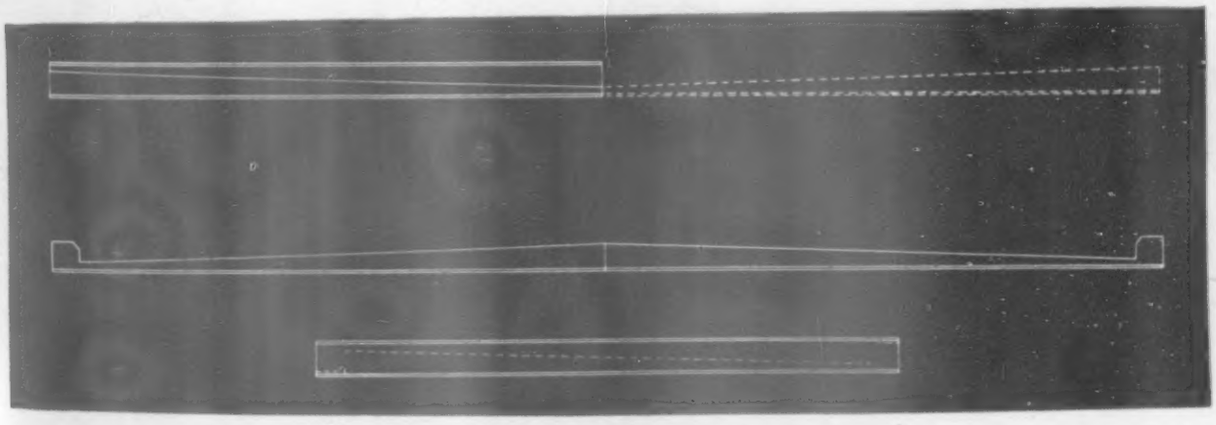


Fig. 6—Tapered "T" chord members are obtained from split I-beams.

Let's Save Oxygen

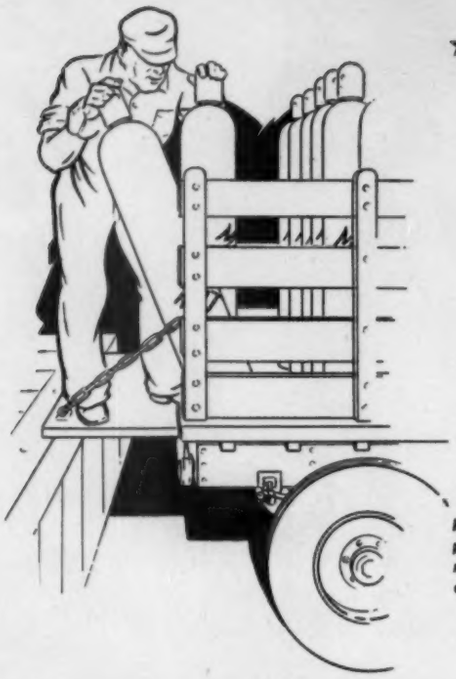


Fig. 1 — Return empties promptly—others may need them. Idle cylinders serve no purpose. Keep 'em rolling!

It is almost inevitable that in the rapid expansion of oxy-acetylene welding and cutting, there should be a period when wasteful practices are prevalent. Furthermore, the wholesale addition of thousands of inexperienced operators has considerably aggravated this condition. There is no question that the conscientious weldor or cutting operator is concerned about eliminating waste, when he knows its source. This article, therefore, is intended to serve as a "check-list" that will help all concerned in preventing a serious oxygen supply situation from becoming critical.

Keeping war production industries supplied with an unceasing flow of oxygen and acetylene for welding and cutting is no less essential than providing the metals needed for production. Demand for these gases has increased enormously. For some time, gas manufacturers have been hampered in their efforts to meet this demand by a shortage of cylinders to transport the gases. Now, there has arisen another source of concern. The oxygen production capacity of the oxy-acetylene industry is being strained to the fullest extent, in attempting to keep abreast of constantly pyramiding oxygen requirements. In spite of additions and expansions of oxygen and acetylene plants, a critical situation faces this industry—and all industries consuming these gases—unless efforts are made by everyone to conserve, particularly in the use of oxygen.

Wasteful Habits

A survey has revealed a considerable number of shop practices which might be disregarded in peacetime, but which today must be considered wasteful. These habits of yesterday, being largely unconscious, can be remedied only by a re-evaluation of the significance of such seemingly trivial practices as using the wrong size hose or torch tip, or opening up a full cylinder when a quarter-full cylinder stands idle.

The following list of recommended practices is based upon observations of correctable conditions in oxy-acetylene welding and cutting shops. The elimination of wasteful practices will not only go a long way toward relieving the "tight" oxygen situation, and insuring an uninterrupted supply of gases, but will also prove economical to the individual shop where such conditions prevail. One shop, for example, was found to be unconsciously wasting approximately 25 per cent of its oxygen consumption, through an accumulation of "insignificant" losses.

1. *Use the proper size torch tip.* A No. 2 tip used instead of a No. 1 for cutting ½ in. plate consumes 10 to 20 per cent more oxygen, 16 per cent more acetylene—all wasted.

2. *Do not use excessive pressures.* This, one of the most common mal-

Fig. 2—Check tip size. An oversize tip wastes gas. If number is not clear, check with cleaning drill.

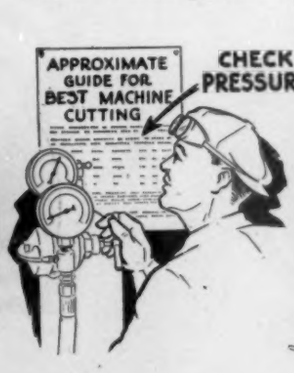


Fig. 3 — Watch your pressure. Excessive pressure wastes oxygen. Keep pressure chart handy. Use it.

Fig. 4 — Close cylinder valve when finished. Between jobs, release regulator screw, to prevent loss of gas through hose leakage.

Fig. 5—Check hose periodically for leaks. Dip hose in water while under pressure. Use soapwater on connections.

The elimination of wasteful practices will save many cubic feet of needed oxygen. Pointers on possible savings are given.

Fig. 9 — Long hose is cumbersome and requires more pressure. Extra lengths get unnecessary wear, invite leaks. Use short lengths.

Sketches by Airco

practices, is usually done by inexperienced operators who believe they thereby get a more efficient flame, or to save a trip to the pressure chart. Manufacturers' rated pressures are the most efficient for average conditions. And when more speed is desired, the new high speed machine cutting tips cut faster without consuming additional oxygen.

Eliminate Leaks

3. *Close cylinder valves when torch is not in use.* If only the torch valves are closed, gas pressure in the hose rises and may force leaks. If leaks are already present or if new leaks are forced, considerable gas will be lost.

4. *Check hose and connections for leaks.* They may be infinitesimal, but a $\frac{1}{64}$ in. diameter leak in hose operating at 100 lbs. will waste 290 cu. ft. of oxygen in 24 hrs.—more than a tankful. The hose should be checked periodically by immersing it in water while under pressure, to show up leaks. Soap and water will reveal leaks at connections.

Hose Is Scarce

5. *Use correct diameter hose.* Hose that is too small for the job requires higher gauge pressure to secure sufficient flow, causing unnecessary strain and promoting leakage in the hose.

6. *Use short lengths of hose.* Unnecessarily long hose also requires higher pressure, to overcome pressure drop in the hose. Also, the surplus lengths, though useless for the job, are subjected to unnecessary wear and tear.

7. *Use all the gas in each cylinder before connecting a new one.* Use every cylinder for all it is worth before disconnecting it. In the larger shops interruptions of work to change tanks can be eliminated by manifolding gas cylinders, or by installing pipe lines.

Return the Empties

8. *Keep cylinder inventories low.* The old custom of keeping plenty of reserve cylinders must be abandoned, for it "freezes" them at a time when rapid turnover is imperative. Gas suppliers are cooperating by providing frequent deliveries. You can help by ordering fewer cylinders oftener, and by keeping reserves of cylinders at a minimum.

9. *Return empty cylinders promptly.* Idle cylinders are production slackers.

10. *Don't leave torches burning when not in use.* It may seem troublesome to be constantly re-lighting the torch, but if it burns idly for even as little as 3 min. out of each hour, it is wasting 5 per cent of its gas consumption. Five percent of last year's industrial oxygen consumption was 360,000,000 cu. ft. Let's use those 1,636,000 tankfuls for welding and cutting, not for heating the air.

Fig. 6—Keep your tips clean. Congested tips are inefficient, wastes time and gas. Keep cleaning drills handy, and use them.

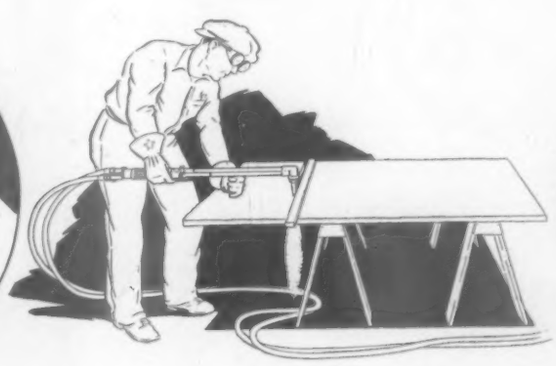


Fig. 7—Keep hose clear of sparks and slag. Avoid serious fire hazards. Besides, minute burns promote leakages, and hose is made of rubber, and should be conserved.

Fig. 8—Don't let torches burn unused. Even 3 minutes out of each hour means a 5% gas loss. Oxygen is precious now. Don't waste it.

11. *Keep tips clean and free from carbon and slag.* An unclean tip is an inefficient tip, and, like any dull tool, is abhorrent to the skilled workman. Congested orifices nullify the value of using proper pressures and speeds, resulting in lower efficiency and consequent waste of gas.

12. *Don't abuse cylinders.* A damaged cylinder must be taken out of circulation. It contributes nothing while undergoing repairs.

13. *Hose: Handle with care.* Because hose is made of rubber, it is most important that it be made to last as long as possible. To ensure this, it must be protected against mistreatment which promotes leaks. Therefore; keep hose out of range of hot oxide and sparks; wash off oil and grease, which ruin rubber; place a plank on each side of the hose where it crosses truck runways; store any hose stocks in a cool, dark place; and when a hose is damaged, cut out the bad portion and spice the ends together with standard splicing nipples.

Essentially these suggestions involve but one basic concept—to uproot yesterday's habits to meet today's demand. None of the recommendations is difficult to accomplish, provided we open our eyes to everyday practices which should no longer be tolerated. Industry needs many waste wardens; they may be unofficial, they may be self-appointed, but if they watch out for wasteful practices among themselves and their coworkers they will be performing a very real service.

Automatic Carbon Arc Welding

Automatic welding and a special welding dolly greatly speeds tank construction.

AUTOMATIC ARC welding, a fast and modern method of fabrication, is speeded still further by the use of ingenious fixtures to cut to a minimum the time required for set-up of the job to be done.

Engineers for the National Steel Construction Company, Seattle, Wash., manufacturers of electric hot water heaters for home use, have devised a unique method of applying the automatic welding head to both the longitudinal seams and the girth seams of the tanks without changing the set-up. Fig. 2 shows a workman striking the arc to start the automatic arc welder at the beginning of the welding of one of the girth seams.

These tanks first are assembled and tack welded lightly by means of the manual electric arc. Then the seams are painted with flux and the tanks are placed on the rotating rolls as shown in the figure. One of the heads then is lap welded by rotating the tank at a constant rate of speed beneath the stationary welding head.

The longitudinal lap weld next is made with the welding head moving along the seam automatically at a constant speed. During this welding operation the tank does not move. When the longitudinal weld is completed, the other girth weld is done by rotating the tank automatically on the rubber-tired rolls. To maintain a ground connection with rubber-tired rolls a special sliding ground connection, as shown in Fig. 1, was developed.

Fig. 3 shows the longitudinal weld partially completed with the arc stopped to give a good view of the smooth, regular seam achieved by means of automatic equipment. When the welding is completed, the welds are cleaned and the tanks are pickled and galvanized.

Engineers for the concern say that the automatic welding head provides higher welding speeds at low welding cost. The seams produced are stronger, smoother and more consistently leakproof.

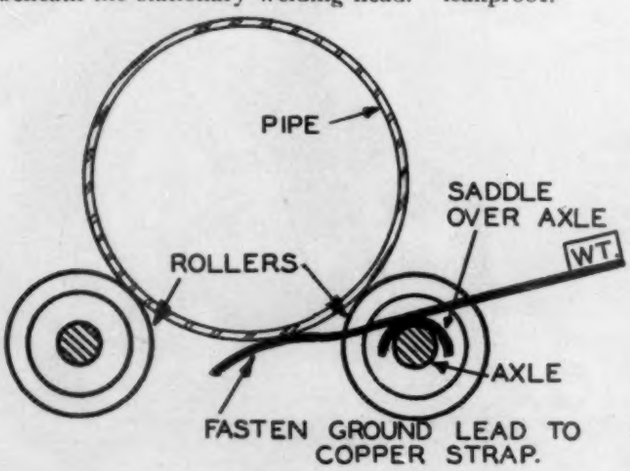
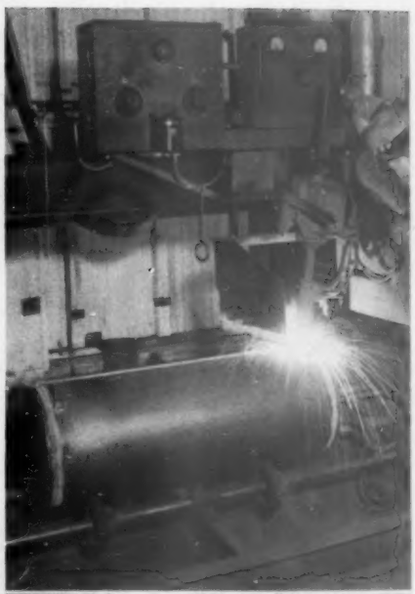
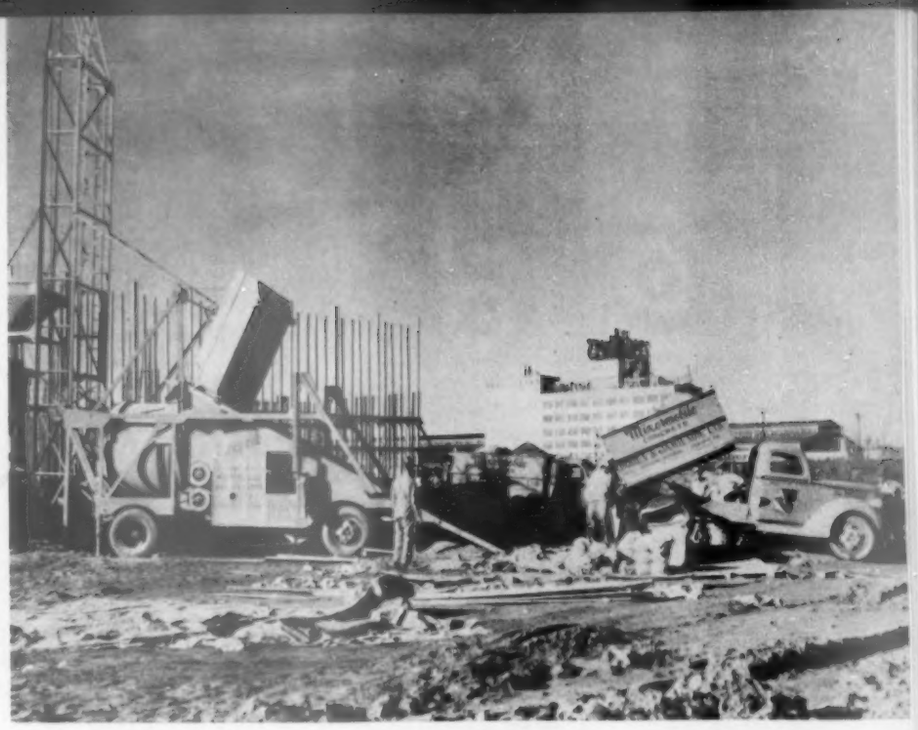


Fig. 1—A sketch showing how ground contact may be maintained when using rubber tired dollies.



Photos by Lincoln Electric Co.

Fig. 2—(Upper) An arc is struck then automatically maintained in this welding operation.
Fig. 3—(Lower) Note the smooth bead produced during this automatic welding operation.



This Mixermobile is starting on the foundation of a building. The tower at the left is up to its normal height of 35 ft.

Welding Brings Business

Three new aids to building construction. Their manufacture represents close to 100 per cent welded design.

By HENRY W. YOUNG

ELECTRIC WELDING and its close associate oxy-acetylene welding and cutting have rendered possible the establishment of more thriving manufacturing enterprises than any other single development in the industrial field.

In Portland, Ore., in 1924 Ed. H. Wagner started a building contraction firm; in 1928 his two sons, G. H. and Harold joined him. There are times when a lot of money can be made in the contracting business; there are other times, such as those that came along in the early '30's, when it becomes a problem of bare existence. When these lean times came, it appeared to the Wagners that the only possible "out" was to find some way of cutting construction costs by using larger and more efficient equipment for placing concrete.

There was nothing on the market. Everybody was using hoisting towers of timber construction, one which had to be erected and then torn down on every job, with the lumber wasted. Hoisting equipment and swinging concrete chute with its system of suspension all to be installed and then dismantled. On each job many hours of pouring time were lost in just setting up and getting ready.

How to Reduce Costs

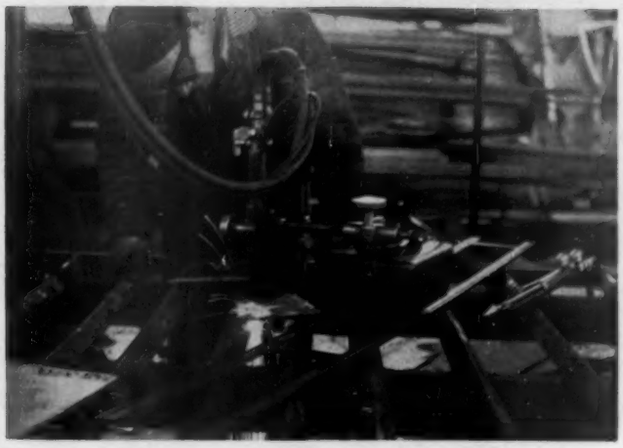
Upon Harold Wagner fell the responsibility of figuring out ways and means to reduce costs. He was in charge of the company's equipment garage. A good mechanic, with an inventive turn, it did not take him long to plan a machine to do the job. This rig would be portable, would mix concrete, take it up to the necessary height and dump it, completely eliminating the building of falsework, and rigging of hoist and chute. The real problem was how he was going to build the machine. There were no machine tools, no welding equipment, no facilities whatever for fabricating metal in his garage.

Using odds and ends of materials he finally built an arc welder. It was not too good but it did enable him to do rough welding and tacking so that the members of his "Mixermobile," as he now called the prospective concrete pouring rig, would hold together until he could get them to a job shop and have them properly welded.

It would be impossible to relate all the trials and tribulations encountered in building that first Mixermobile. A transmission here, an engine block there, axles somewhere else and steel where he could find it. Finally the unit was finished and, after successful tests began to save money on the contracting end of the business.

The Mixermobile

Briefly, this machine consists of a concrete mixer and its power plant mounted on the rebuilt chassis of a truck. There is a folding tower of steel angle which can be let down to rest on the truck over the mixer when moving from one job to another. In



Flame-cutting equipment eliminates the need for more expensive equipment and is much more flexible.

this tower is a hoist operated bucket of ¾ cu. yd. capacity which dumps to a hopper which may be fastened at any height on the outside of the tower. This has a capacity of 1½ cu. yds. Between the two they take the charge of the two-yd. mixer with margin to spare. On the forward end is a skip which receives the measured aggregates and cement direct from the service truck sufficient for a single mixer charge and lifts them up and over into the mixer.

Advantages on Job

On the road, this rig is as fast and easily maneuverable as any truck. Arriving at the job it is spotted and ready for operation in a few minutes; only one man is required for complete operation. It starts in with the basement and works right on up to the practical limits of the tower, which is 65 ft. without guying. The normal height of the tower is 35 ft. but this may be increased by adding 10 ft. sections. The unit will pour a building four to six stories high without any falsework or hoist and chute assemblies. Occasionally, the contractor may build an outside wooden tower to serve as a loading dock for his wheelbarrows or other method of conveyance, even this is not essential on most jobs.

The equipment proved so satisfactory that the following winter two more Mixermobiles were built and a fourth the next summer, all used in the Wagner contracting business. After the first one it was not so tough to make more money for the shop end of the business. New materials were used instead of junk and real welding equipment added to the shop.

Commercial Possibilities

From the time the first one had made good there was thought of building Mixermobiles for sale. No advertising was done as it was decided to let the idea get noised about by word of mouth, so it was several years before the fifth machine, one for sale, was built. This was in 1939. In all three were sold that year. By June 1940, a separate manufacturing company was formed, known as Mixermobile Manufacturers. Business began to gather momentum. To the present time, about one hundred have been built and sold in various parts of the United States and Canada. Since these machines list at $9950 each, it can be seen that the first old home-made arc welder had touched off something of considerable importance.

Fabrication Methods

The factory building where this work is done is not over 75 by 150 feet, the main floor served by a 10-ton crane which they designed and built themselves. About 30 men are employed, 12 arc weldors, which is indicative of the fact that this comes as near to being a hundred per cent welding procedure as will be found anywhere. Starting with a standard Ford truck chassis and power plant, the Mixermobile is built on and around it, after first rebuilding the truck frame.

The unit is literally on and around itself, the skip, the front track, bucket and tower are about the only members that can be welded up separately and then put in place. All the rest is position welding, some of it of very exacting nature. The weldors must be able to get in and do good work with no more latitude than the automobile mechanic has in working on a car.

Flame-Cutting Uses

In the design, very few castings are used and these are steel rather than cast iron to facilitate the welding work. Here welding and cutting is depended upon as about the only means that a new and small concern can get a start in building large equipment of this character. All shapes are cut from steel plate by means of an oxy-acetylene cutting machine, while hand torches are used for cutting all sorts of small pieces. Standard structural steel is used altogether. It is satisfactory for this type equipment and calls simply for a good, all-purpose rod in welding. This simplifies the welding problems considerably for a weldor is using the same kind of rod on the same kind of steel all the time, from tacking to final weld. The main thing he has to keep in mind and learn is how to reach and work in the tough places. After working on two or three of the machines he learns how to meet each and all of these situations with little difficulty.

The Mixermobile does not represent the complete output of the factory. In operating this machine, it was found that the concrete could not be moved fast enough with men and wheelbarrows to utilize the full capacity of the 2 yd. mixer. So Wagner is now building a three-wheel conveyance with an engine on it, which he calls the Buggymobile. Two sizes are made, one of ½-yard capacity and one of 1-yd. capacity. With a little wider staging, the Buggymobile runs around over the building with almost the same flexibility of

The weldor must work in and under the same as an automobile mechanic. Here he is performing an operation preparatory to fitting the truck with two sets of transmissions and differentials to make a "twin-motored" truck.

The small type Buggymobile can go practically anywhere a man and wheelbarrow can. Here it is used in pouring walks around a small residence.

operation as a man and wheelbarrow. This Buggymobile also renders the Mixermobile more practical and economical for small residential building, in pouring walls, floors, sidewalks and concrete steps. One man on the Mixermobile, one on the buggy and one helper take the place of the ordinary crew of six, three on the mixer and three wheelbarrow men.

In the contracting business considerable time is lost by trucks in moving equipment and material on long, hard grades. To overcome this the company built a new type of truck, one with two motors in one truck; a rather simple idea but nobody seems to have done it before.

Twin Engine Truck

Taking a Ford truck chassis, a weldor with torch and arc rebuilds the frame to accommodate any kind of body or tank. On the front end are mounted two Ford, six-cylinder engines side by side. Each is independent of the other and each by its own transmission and differential is made to drive one of the two pairs of rear wheels. What you have, then, is a 12-cylinder, four wheel drive truck. Going along level roads or on light grades, use one engine. Coming to a heavy grade, kick in the other engine and walk right up at practically normal speed without using such low gear ratios as make most trucks a nuisance to themselves and everybody else on hills. There are other advantages also, such as having a spare engine and if you have engine trouble being able to come in with the other, saving down time on the road and possible towing charges.

Coming at you, the truck does not look too much like twins, because they have taken the regular radiator shell and hood, opened them in the middle with a cutting torch and then welded in a section of the same design to form a new and wider one to cover the two engines.

Harold Wagner does not have to build his own welding machines any more. It is doubtful that with all this excellent and practically new equipment at his disposal he would attempt or could actually build another that would be any better or be anywhere near as important as that first one which was the product of junk, sweat and desperation.

Given plenty of welding machines and torches, the young manufacturing concern can make most anything in the fabricated line and do it as well as the big factories with all sorts of equipment and assembly lines, though not as fast naturally. Without them it would be impossible these days to even start the business.

A Welded Scrap Breaker

By **HARRY F. GRAHAM**

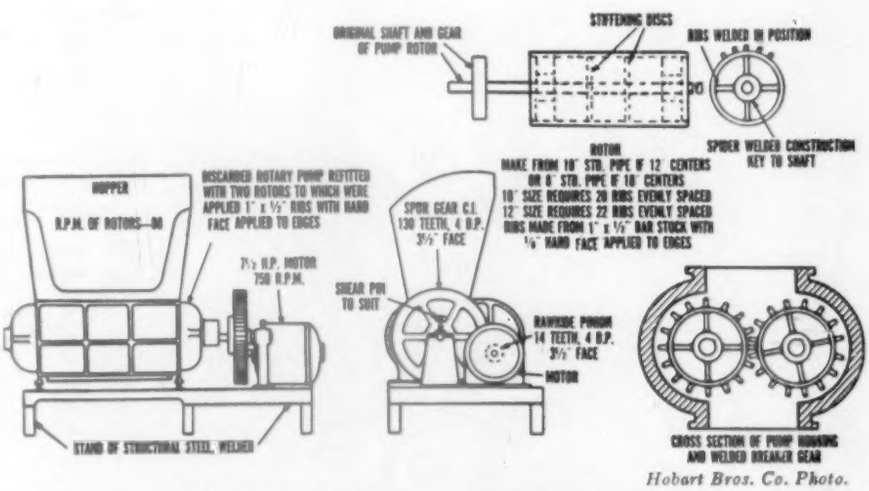
The National Steel Car Corp., Hamilton, Ont., has been steadily producing shells on a large scale for the British Government for several years. In this production tons of long spiral-shaped cuttings came from the lathes each day. These cuttings were so bulky scrap dealers would accept them only if they were broken into small pieces—and breaking them was indeed a job.

It was discovered that these cuttings, due to their high carbon content, could be broken when bent at a 45 deg. angle. By experimentation it was determined that breaking could be accomplished by running the cuttings through gears. Since no suitable scrap breaker could be found, the company decided to build one. A discarded rotary pump, bought at a cheap price at a local scrap yard, was to serve as the main unit of this home-built scrap breaker.

In converting from pump to breaker, the rotors were replaced with gears. These gears were made by flame-cutting two 36 in. lengths of standard 10 in. pipe and welding 1 x ¼ in. bars 36 in. long around the circumference to form teeth. Hard-facing was then applied to each tooth top to prevent excessive wear. Two 10 in. discs with 6 inch holes were welded 14 inches from each end to serve as stiffeners for the gears. The hubs were made from 6 inch round steel 4 inches long bored and keyed to fit the pump rotor shaft. They were held in place by four pieces of 2 x 4 x ½ in. mild steel welded together as shown in the illustration.

The necessary hopper was constructed of ¼ in. plate, arc welded together and bolted to the top of the pump housing. The breaker was mounted on an angle-frame about 18 in. high so that broken cuttings could be easily shoveled from underneath. Scrap breaker was driven by a 7½ hp. motor, which had been geared down to 80 or 90 rpm.

This machine proved so successful that three more were made. The largest of these three additional scrap breakers stands 8 ft. high, has gears 22 x 84 in. It is believed that only with arc welding was it possible to so easily convert old rotary pumps into efficient, economical scrap breakers.


ORIGINAL SHAFT AND GEAR OF PUMP ROTOR
STIFFENING DISCS
RIBS WELDED IN POSITION
SPIDER WELDED CONSTRUCTION KEY TO SHAFT
ROTOR
MAKE FROM 10" STD. PIPE IF 12" CENTERS
OR 8" STD. PIPE IF 10" CENTERS
10" SIZE REQUIRES 28 RIBS EVENLY SPACED
12" SIZE REQUIRES 22 RIBS EVENLY SPACED
RIBS MADE FROM 1" x ½" BAR STOCK WITH
⅛" HARD FACE APPLIED TO EDGES
HOPPER
R.P.M. OF ROTORS—80
DISCARDED ROTARY PUMP REFITTED WITH TWO ROTORS TO WHICH WERE APPLIED 1" x ½" RIBS WITH HARD FACE APPLIED TO EDGES
7½ H.P. MOTOR 750 R.P.M.
SPUR GEAR C.I. 130 TEETH, 4 D.P. 3½" FACE
SHEAR PIN TO SUIT
RAWHIDE PINION 14 TEETH, 4 D.P. 3½" FACE
MOTOR
STAND OF STRUCTURAL STEEL, WELDED
CROSS SECTION OF PUMP HOUSING AND WELDED BREAKER GEAR

Hobart Bros. Co. Photo.

An old pump, welding and hard-facing have been combined to build an efficient scrapbreaker.

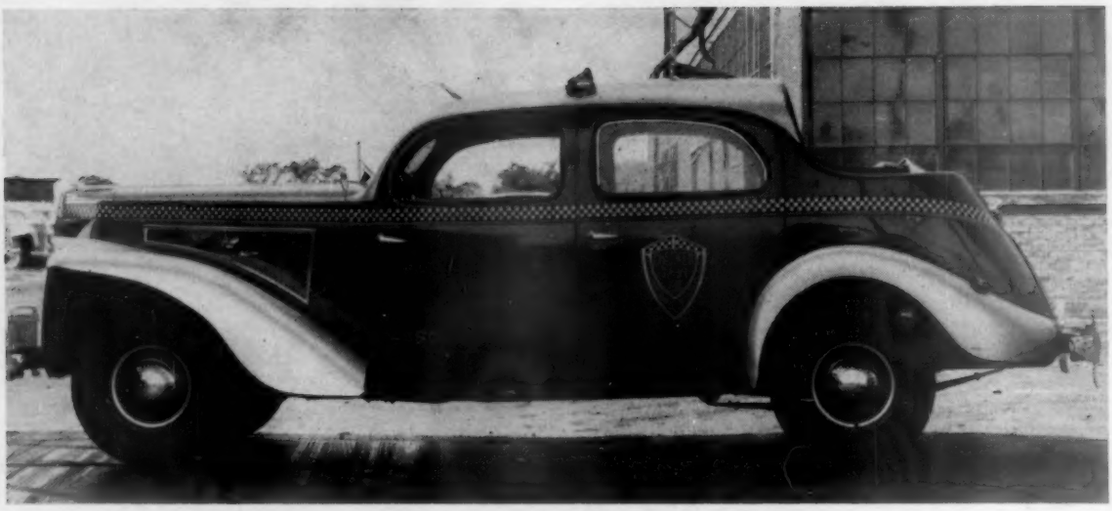


Fig. 1—Welding plays an important part in the building of this cab.

Building Checker Cabs

Taxicab manufacture presents the problem of building a vehicle possessing the ruggedness of a truck while retaining the comfort and appearance of a limousine. The answer is in the extensive use of welding.

TAXICAB manufacture apparently will be a thing of the past for some time to come but nevertheless, some of the production problems still hold interest. When the fabrication methods used in the building of the Checker Cab are studied, it can be seen why these cars stand up so well despite their severe service conditions.

Welding is one of the answers as will be disclosed by a trip through the plant of the Checker Cab Manufacturing Corp., Kalamazoo, Mich.

A modern motor vehicle for cab service is no longer the heavy truck-type automobile of a few years ago. A cab today must offer all the comfort, safety and convenience of the finest limousine. In addition, it possesses the stamina and ruggedness of its predecessor. The meeting of these design demands has resulted in the manufacture of a cab which combines many fine appointments to please the most exacting critics.

The modern Checker Cab is an example of what has been done to improve the appearance and riding qualities of a cab. There is disappearing tonneau, spring and sponge rubber cushions, and even a mirror for "milady."

While these features may not be necessary, they tend to add to the comfort and pleasure of the passenger. Taxicab operators have found that comfort and safety are two features sought by a passenger and if provided they bring increased revenue through increased business.

Welding for Safety

Safety is built into these Checker Cabs. It is attained in two ways: (1) Through the use of heavy steel members and (2) the use of welding. Electric arc welding plays a large part in the manufacture of the 500 cab bodies per month required to meet production schedules; by its use, time and therefore money is saved. Other advantages of arc welding are found in its flexibility which makes possible its use in many different ways and the fact that the warpage is held to a minimum.

Due to the everyday service which cabs must render, a great many parts must be designed so as to be easily and quickly changed. Fenders and body sections particularly must be designed with this in mind, however, this feature is carried throughout the body.

In Fig. 2 the weldor may be seen working on the tonneau panel assembly. Since the tonneau has to be rigid so that it can be operated easily from the open and closed position, it is necessary to weld stiffeners to the light sheet used in its construction. These stiffeners are 14 gauge metal and are welded to the 18 gauge body sheet. A $\frac{5}{32}$ in. electrode is used in their application. The 8 stiffeners are welded only at the top and bot-

Fig. 2—Eight stiffeners are welded in tonneau panel assembly.

tom, making 16 welds approximately 2 in. long for this particular job.

Jigs Aid Production

Stiffeners are also used on the hood top so as to reinforce this particular part of the body. In Fig. 3 a weldor can be seen welding the stiffeners on the hood top. There are two on each side. This involves the welding of 16 to 20 gauge body stock and there are some 8 welds on each hood top section. This welding operation is carried on using a ⅛ in. electrode.

In some cases to facilitate building the body, jigs are used to aid in the construction. An example of this is found in the building of the dash assembly. This unit which involves approximately 130 welds, is welded in a jig as is shown in Fig. 4. In this illustration a finished assembly is shown immediately to the right of the jig.

Small Diameter Electrodes

The welding of intermediate body mounting brackets is shown in Fig. 5. This operation consists of welding a 11 gauge bracket to a 14 gauge wheel house. In Fig. 5 may also be seen the main assembly jig and the progress of welding while the rest of the body is being assembled. A ⅛ in. electrode is used to weld the intermediate bracket to the wheel house. In this case the application is on a vertical seam which is some 8 in. in length.

The next step on the main assembly line is shown in Fig. 6. The bodies are now well on their way to completion and the welding operator is welding a wheel house extension to the body. This is a 9 in. vertical weld and again a ⅛ in. electrode is used. One operator takes care of the entire production making two welds similar to the one shown in Fig. 6

(*Continued on page 48*)

Fig. 3—The hood is also reinforced by stiffeners.

Fig. 4—3 jig holds the dash assembly for 130 welds.

Fig. 5—The body is held in a jig while parts are welded in place.

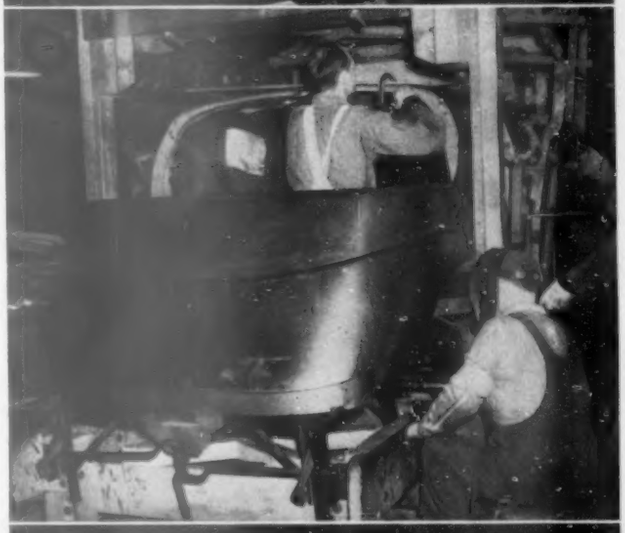


Fig. 6 — Welded dollies carry the cab bodies along the assembly line.

A Water Tank for Tulsa

Fig. 1—Tulsa's new 2,500,000 gal. welded steel reservoir.

AN EXTREMELY attractive arc welded steel reservoir, which supplements slack-period water supply and which has a daily capacity of 2,500,000 gal., was recently completed for the City of Tulsa, Oklahoma.

The pleasing appearance of this modern structure is evident from Fig. 1. This resulted from a recommendation of W. F. McMurray, superintendent of the Water Department, to utilize a special design instead of a plain standpipe. Extremely attractive architecturally, the structure which is adjacent to a residential section, is in complete harmony with surrounding buildings. It is of welded construction, with eight vertical ribs or pilasters extending up the shell at equidistant points and over the ellipsoidal roof to an ornamental cupola at the center.

The pilasters are U-shaped in section, 3 ft. wide by 3 ft. thick, welded to the tank with the bottom or rounded portion of the U out. They are joined, at the inner ends, to a compression ring surrounding the cupola and serve as trusses for the roof. There are no interior columns, the entire weight of the roof being carried by the external ribs and intermediate curved trusses under the roof plating.

Details of the welded construction are shown in the sketch Fig. 2.

The overflow pipe from the top of the tank is located in one of the vertical ribs, while another houses a vertical ladder and the electrical conduits. The cupola serves as a vent for the tank and supports an airplane beacon light.

The exterior of the tank is painted with a self-cleaning paint, over a field coat of red lead. The plain white, without trim, harmonizes with nearby residences and reduces the temperature in the tank during hot weather. The interior surfaces were given two coats of red lead.

The new reservoir, which has a self-supporting ellipsoidal roof, was erected to take care of increased needs for water imposed by industrial expansion. It was built 85 ft. in dia. by 60 ft. high as a tank of those dimensions could be incorporated in the system without requiring additional pumping equipment.

The reservoir, which rides on the system, is filled during period of minimum demand. Then, during peak periods, water from the reservoir feeds back into the mains, maintaining a minimum pressure of 20 psi. Normally the reservoir supplies about 1,000,000 gal. per day for domestic service. The remaining 1,500,000 gal. capacity provide a reserve for fire protection.

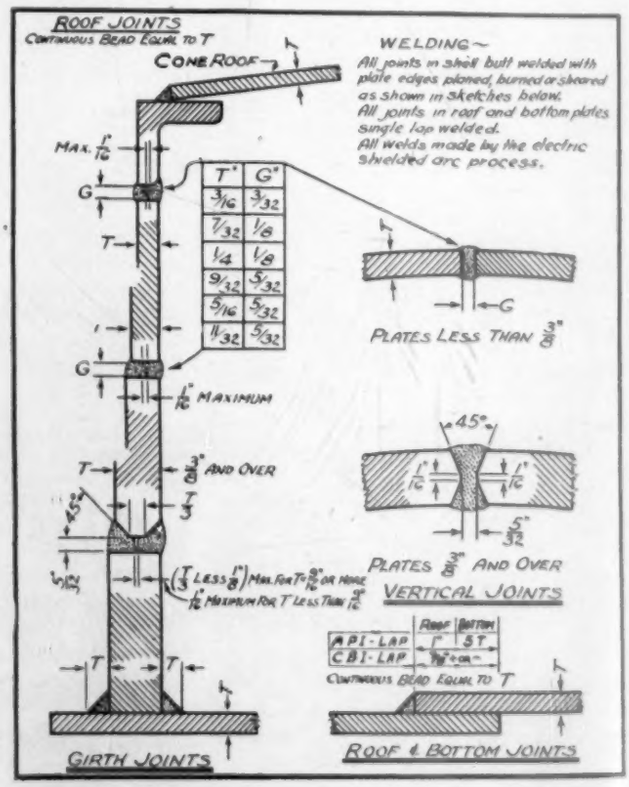


Fig. 2—Construction and welding details.

Illustrations Courtesy Lincoln Electric Co. and Chicago Bridge and Iron Co.

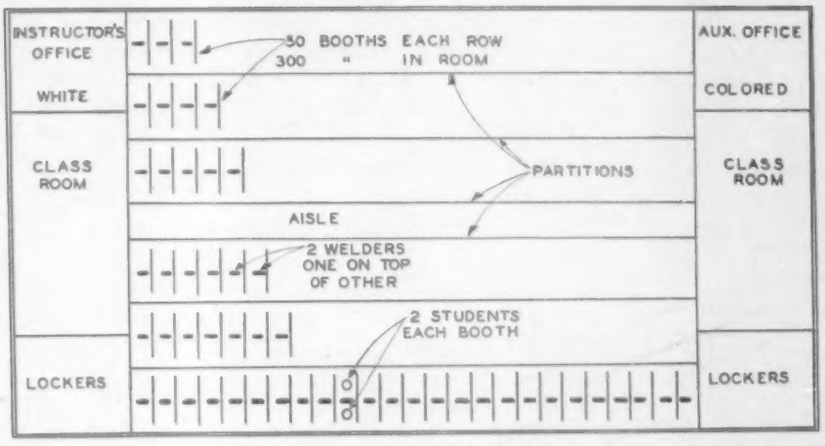


Fig. 1—A floor plan of the welding school.

A Shipyard Welding School

Three hundred trained weldors a week is the schedule of the Higgins Corp. shipyard welding school. In this article there are given pointers on how such a program will be accomplished.

THE HIGGINS CORP. of New Orleans is faced with the enormous task of training personnel for one of the largest ship building programs to be undertaken in this country. Their problem is that of taking some 75,000 white and colored persons and training them for the various tasks assigned shipyard employees. It is their hope that after a short intensified training period that employees who heretofore have had no industrial training will become sufficiently skilled to handle the work of various shipyard crafts. To accomplish such a program it has been necessary to set up a trade school in which welding, cutting, rigging, pipe fitting and many kindred trades are taught.

Under the direction of G. W. Rappleyea, Director of Training, the old Standard Oil Warehouse on New Orleans' south side is being converted into the world's largest industrial training school. Since the welding processes will engage the activities of some 25% of the yard's personnel, a major portion of this two story building will be devoted exclusively to the training of welding and cutting torch operators under the supervision of James Norse, Chief Instructor. The school for cutting operators will be on the first floor, while the 25,000 sq. ft. of floor space on the second floor of the building will be devoted to the training of weldors. The general layout of the welding school is shown in the plan in Fig. 1. While no doors have been indicated in this plan, there are means of free access to the lecture rooms, locker and shower rooms, stock rooms and the executive offices on the floor.

In the Higgins employment plan it is expected that 40% of the personnel of the yard will be colored. So naturally the plan for training colored workers has been included in the training organization. Initial plans call for use of one-half of the building to train white workers while the other half will be set aside for colored students. In this unique plan it is expected that at all times 300 students will be enrolled in the school —150 white and 150 colored—until the training program has been completed.

The school has been provided with equipment to train 300 students simultaneously. There are 300 arc welders of various sizes ranging from 200 to 400 amperes. These welders are mounted one on top of the other in a welding booth to conserve space. The welding booths are so arranged that, each student is assigned a welding machine and booth of his own. In this booth there is a

work table so that it might be said the individual student has his personal work shop.

Welding classes will be conducted on a round the clock basis six days a week. Each student will be in his class for a period of four weeks during which time he will receive 144 hours of instruction. 120 hours of this instruction will be in actual welding training under the supervision of expert instructors. The remaining 24 hours will be in the form of class room lectures. The schedule of class have been so arranged that there are four 6 hour classes a day. The morning class is from 6 a. m. 'til noon, the afternoon class from noon to 6 p. m., the evening class from 6 p. m. to midnight and the graveyard class running from midnight to 6 a. m. The first five days of each week are devoted to welding practice while Saturday is taken over by general discussions of the theory of welding, reviewing the practical problems that have been studied during the week and outlining the problems that will be taken up the following week.

During the period of actual weld training the student is afforded the opportunity to become acquainted with various types of welding machines as well as the use of various types of welding electrodes. The training includes the use of all types of welding electrodes from 1/8 in. to 3/8 in. of the shielded arc type. Most of the training is for downhand work. The student, however, is provided with exercises involving many hours of vertical and overhead welding. In this manner he becomes familiar with all types of welding. Upon completion of the work the student is given a diploma certifying the fact that he has completed his welding training and passed the necessary examinations.

All that is necessary to become a prospective trainee is to indicate willingness to become an employee of the Higgins Corp. Before they are registered, however, all prospective students are given preliminary qualification tests including color blindness examinations. Having been enrolled in the school, they are placed on probation for one week. During this probationary period it is determined whether the student has the physical make up and aptitude that is required of a good weldor. Having passed the probation period a student continues until he completes the four weeks' course. If during probation it is ascertained that the student is not of the right make up to become a weldor, it is planned to drop him from the course recommending possibly that he try his hand at one of the other trades offered in the school, that is, oxy-acetylene cutting, pipe fitting, erecting, rigging, etc.

One of the unusual features of the welding course is that training is provided without cost to the trainee other than 50¢ for a text book. While it is recommended that the text book be purchased, it is not compulsory. There is also a $1.50 deposit which must be made for the welding lens in the helmet used. If the lens is returned unbroken at the end of the course, this $1.50 is refunded to the student.

The first class will consist of 300 students—150 white and 150 colored. Each week thereafter there will be a similar number of students enrolled and at the end of four weeks training 300 students will be graduated and thereafter each week a similar number will complete their training. At all times after the first four weeks there will be no less than 1200 students enrolled in the welding school. A total enrollment of 2,500 to 3,000 men is expected by July 1 and by October 1 it is hoped that there will be about 3,600 trained weldors with a proportionate number of trained employees in the other crafts available for use in the yard. These figures are based on a labor demand of about 40,000 employees though it is expected that by January of next year nearly 75,000 persons will be on the payroll.

When the yard is in full swing it is estimated that weldors will constitute about 21% of the payroll while cutting torch operators will make up 3½%, meaning that about 25% of the men on the hourly payroll of the Higgins shipyard will be engaged in the welding profession.

All of this has been possible due to the untiring efforts of one man, Andrew J. Higgins, Sr., who is aided in this vast enterprise by his brother, Frank, and his five sons.

» «

Do not throw away this issue of *The Welding Engineer!* When you are through with this magazine pass it on to your friends, so that they might also keep abreast with welding happenings.

» «

Photo Linde Air Products Co.

Automatic flame-hardening for the localized heat-treatment of bearing surfaces of tank-turret rings. The ring revolves past the stationary hardening unit in the foreground. The turntable is tilted so as to facilitate the disposal of the quenching water, which directly follows the oxy-acetylene heating flames.

The Technical Slant

Employ your time improving yourself by other men's documents; so shall you come easily by what others have labored hard for.—*Socrates*

Engineering Data

TECHNIDATA. *By Edward L. Page. Published by Norman W. Henley Publishing Co., New York, 1942. Spiral bound paper, 5½x8½ in., 64 pages. Price $1.00; Cloth, $1.50.*

In this small volume the author has compiled, in condensed form, most of the essential information needed when working with the exact sciences. The subjects treated include: Mathematics, Physics, Chemistry and Engineering Mechanics.

The data presented is organized in a compact form and while not intended as text book material it does afford the uses of a file of reference material for review purposes. The many formulas, symbols and units are presented in a concise, final form; all non-essential data and derivations have been omitted. In addition to formulas, definitions, etc., there are many tables relating to the four phases of engineering discussed.

Information relating to high mathematics, i. e., algebra, geometry, trigonometry and calculus is included in the first section of the book. The second section deals with all the physical laws, while definitions, laws, and theory of chemistry make up part three. The book is closed with data pertaining to engineering mechanics and information on how to use the slide rule.

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Machine Shop Training

LATHE JOB TRAINING UNIT. *By Staff of Dunwoody Industrial Institute. Published by American Technical Society, Chicago, 1942. Spiral bound paper, 8½x11 in., 141 pages. Price $1.35.*

GRINDER JOB TRAINING UNITS. *By Staff of Dunwoody Industrial Institute. Published by American Technical Society, Chicago, 1942. Spiral bound paper, 8½x11 in., 111 pages. Price $1.25.*

SHAPER AND PLANER JOB TRAINING UNITS. *By Staff of Dunwoody Industrial Institute. Published by American Technical Society, Chicago, 1942. Spiral bound paper, 8½x11 in., 115 pages. Price $1.25.*

BENCH WORK JOB TRAINING UNITS. *By Staff of Dunwoody Industrial Institute. Published by American Technical Society, Chicago, 1942. Spiral bound paper, 8½x11 in., 155 pages. Price $1.35.*

DRILL PRESS JOB TRAINING UNITS. *By Staff of Dunwoody Industrial Institute. Published by American Technical Society, Chicago, 1942. Spiral bound paper, 8½x11 in., 103 pages. Price $1.25.*

MILLING MACHINE JOB TRAINING. *By Staff of Dunwoody Industrial Institute. Published by American Technical Society, Chicago, 1942. Spiral bound paper, 8½x11 in., 110 pages. Price $1.25.*

INSTRUCTORS' GUIDE. *By Staff of Dunwoody Industrial Institute. Published by American Technical Society, Chicago, 1942. Paper, 8½x11 in., 39 pages. Price 75 cents.*

These 7 job training units or manuals have been prepared as a result of years of experience in vocational training at the Dunwoody Industrial Institute. As such, they are ideal for use in any training plan designed to mass train machine shop workers for our war production program.

The unique feature of this training plan is that it has been designed to conserve material. For example, a job is started on the lathe and then it is carried through to completion using the various machines and tools involved. It is the aim of each book to cover the important points of a particular job as well as the operation of a particular machine. For example, in the booklet on bench work, information is given which completely covers bench and floor work including selection and preparation and laying out of steel stock and castings, measuring and gaging fittings, adjusting and machine repairs. It explains the best use of machinist's hammer, files, hack saw, squares, dies and reamers as well as fine and precision tools for laying out, locating, measuring and gaging, such as caliper, dividers, micrometers, combination square and surface gages. The coverage of material in the other manuals is as complete for the particular machine tool discussed.

There is a job instruction sheet for each job plus questions for each job, job check sheet and hints on blue print reading, etc. The check sheet contains the correct answers for the various questions asked throughout the manual.

The instructors' guide furnishes useful information and suggestions regarding the use of any of the training manuals. It covers the use of the manual itself, the organization and control of the training experience and methods of instruction. The series are so designed that it is suitable for trainees in regular or in pre-employment training as well as refresher and supplementary courses in industrial and trade schools.

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Personal Data

ALL ABOUT ME. *By J. M. Bruer, Published by American Technical Society, Chicago, 1941. Spiral bound paper, 8½x11 in., 92 pages. Price $1.00.*

In this 92-page book there is compiled practically all of the personal data forms required during a person's lifetime. When completed there would be told the complete life story of an individual beginning with the birth certificate and continuing with information regarding education, training and employment. There are also included forms used for vocational training, employment applications, surety bond, etc. Space is provided for personal data such as social security number, credit rating, naturalization data, etc. This book will prove quite valuable to those who wish to compile personal data in a compact and concise form.

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Aviation

HOW TO DO AIRCRAFT SHEET METAL WORK. *By Carl Narcrass and James D. Quinn, Jr. Published by McGraw Hill Book Co., New York, 1942. Cloth 6x9 in., 284 pages. Price $2.20.*

The authors of How to Do Aircraft Sheet Metal Work have prepared an excellent how-to-do-it book for the thousands now engaged in aircratt sheet metal work.

A fairly complete discussion on simple blueprint reading followed by one dealing with shop mathematics opens the book. These two chapters prove quite helpful to one just entering this field of endeavor. In the chapters which follow the reader is given pointers on the working properties of standard aircraft materials, how to layout sheets and how to use the various tools required in sheet metal work.

The closing chapters discuss sheet metal practice in various aircraft plants including the use of jigs and skin fitting methods. The welding of sheet metal, which is confined to spot welding, is quite brief and told in less than 9 pages. Aside from this one weakness the book will be found to be a valuable text for those engaged in aircraft sheet metal work.

» «

Construction

BUILDING INSULATION. *By P. D. Close. Published by American Technical Society, Chicago, 1941. Cloth 5½x8½ in., 328 pages. Price $3.00.*

Insulating materials and the subject of insulation are thoroughly treated in Building Insulation. Written in the popular how-to-do-it style the author has covered the subject in such a manner as to make it understandable to the consumer who intends to use insulation in a new or remodeled home. At the same time the information is sufficiently technical and practical to be of considerable value to the engineer and architect.

Insulation against heat, cold and sound is discussed from every possible angle. There is included recommendations as to the type of insulating material to use, means of calculating heat losses, fuel savings, insulating efficiencies as well as pertinent data regarding insulation. Also included in this excellent volume is a list of over 200 commercial insulating materials giving trade name, description and manufacturer.

The volume is closed with a number of questions pertaining to building insulation which will prove extremely valuable in a self-study plan of the subject.

Welding

LESSONS IN PRACTICAL ARC WELDING. *By W. J. Chaffee. Published by Hobart Trade School, Inc., Troy, Ohio, 1942. Paper 5½x8 in., 188 pages. Price 75 cents.*

Lessons in Practical Arc Welding contains the complete series of 41 arc welding lessons offered by the Hobart Trade School. This material is a reprint of the welding training section of Practical Arc Welding* by the same author. It discauses preliminary instructions, such as starting and manipulating the arc, and carries the student on through an entire course in welding discussing bare electrodes, the welding of light gage sheet and general welding in the various positions with heavily coated electrodes. In addition, data is given on pipe welding, cast iron welding and special practices and tests. The text, which will be found quite practical in arc welding training, contains a suggested class room procedure. The material is presented in a simple and easily comprehensible manner.

*See February, 1942 issue, *The Welding Engineer.*

» «

Inspection

METALLURGICAL AND INDUSTRIAL RADIOLOGY. *By Kenneth S. Low. Published by Sir Issac Pitman & Sons, London, 1940. Cloth, 5x7 in., 88 pages. Price $2.50.*

In this small English publication there is given comprehensive information regarding radiology. The book opens with an introduction to the theory of x-ray equipment discussing the general principle of x-ray and the value of its use in industrial inspection. Subsequent chapters discuss apparatus and equipment, accessories, appliances and materials, radiographic technique, interpretation of radiographs and industrial fluoroscopy. There is a complete chapter discussing radiographic examination of welds. This particular chapter contains many interesting pointers as to the best manner for taking radiographs and discusses the various defects that may be detected by radiographic examination. While the chapter is short, it is one of the most complete discussions of radiographic examination of welds that has come to this reviewer's attention.

» «

Welding

ELECTRIC AND OXY-ACETYLENE WELDING. *By H. P. Manly. Published by F. J. Drake & Co., Chicago, 1941. Cloth, 4½x7 in., 272 pages. Price $1.50.*

This volume on welding appears to be lacking in many respects. It is the opinion of this reviewer that the author is unfamiliar with welding and welding processes or otherwise there would be no reason for some of the apparent errors and omissions found within this volume.

The book opens with a discussion of metals and their alloys and carries the reader on discussing the various welding processes. Much of the material in the book is devoted to gas welding equipment and gas welding practice. However, much of the equipment which is described and the trade names that are used are no longer current or in common use. As the reader continues he will find that a chapter of the book has been devoted to forge welding, blacksmithing, forging and bending and forge welding methods. A chapter has been devoted to each electric resistance welding and arc welding. The information contained in the latter chapter presents very little that is new in the field of arc welding and fails to make mention of A-C arc welding whatsoever.

» «

Transformer Tanks

(*Concluded from page 32*)

Fig. 5—After welding the tanks are spray painted.

» «

known as Spra-Bonderite. An operator is pictured in the spray room in Fig. 5. This extra treatment gives a fine rust proof surface which is an excellent base for painting.

The bonderizing operation is followed by the application of an especially developed synthetic inhibitor as a protective primer and two coats of dark grey paint. All are thoroughly baked on the tank. The resulting finish is comparable to that now used on automobile fenders where an especially difficult problem in wear and corrosion resistance is presented.

When the painting and baking has been completed the transformer tank is ready for another assembly line. It is on this line that the electrical equipment is installed and a finished transformer is produced.

Of special interest are the precautions which have been taken to provide safe working conditions. It will be noted from the various illustrations in this article that the operators of the seam welders wear face shields even though there is little likelihood of flash. They are likewise fitted with rubber boots to protect them from the damp and wet floors always encountered in seam welding. The operators engaged in other welding operations wear safety goggles while the painters are fitted with approved respirators.

Checker Cabs

(*Concluded from page 43*)

as well as several other small welds on various places in the body. The weld time involved in making the weld on a wheel house extension is 37 seconds.

An interesting point that should be observed is the fact that the dollies used on the assembly line are of welded construction. After the body has progressed through the various stages of construction along the assembly line and the welding has been completed, it is then sent to the paint shop followed by a trip to the upholsterer, finally to be mounted on the chassis to produce a finished cab as is shown in Fig. 1.

The welding that is done on the Checker Cab as a rule is done in such a way as to conceal it wherever possible. Therefore there is little finishing to be done. It is not necessary to grind or in any way finish any of the electric welds made on the entire body. This is a good point to keep in mind in arc welded design and the Checker Cab Co. has done it to good advantage.

The photos used for illustrations in this article were furnished by the Checker Cab Mfg. Co. and the Lincoln Electric Co.

» «

Brief Sketches of Welding Jobs

238 welds were required to make each of these accumulators.

Photo by Air Reduction

Lining Them Up

Skillfully planned and executed arc welding lines up 124 pieces of pipe and 60-odd fittings in rigid formation to serve as an ammonia accumulator for a water cooling system. This view, in the plant of Vilter Manufacturing Co., Milwaukee, Wisconsin, shows the construction of two of these accumulators nearing completion. Nearly all of the 238 welds in each assembly were in Tee connections requiring accurate profile cuts and careful fit up to preserve the alignment of the numerous inlet and outlet connections.

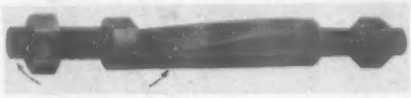


Photo by Harnishfeger Corp.

Repaired wedge just before installing it in engine. Arrows show welded-on end.

Welding Saves Time

When a troublesome noise in a 28x32 poppet valve crank necessitated tearing down a steam engine in an eastern metal working plant, the chief power engineer found that the upper stud was broken off of the wedge, about 3/8-in. from the shoulder. Immediately he had the engine builder on the phone. "No wedges in stock and three days to make one," said the builder. What a headache came to the engineer! That meant 40% of shop production would be held up while the engine was down. "But why not repair the wedge?" he suddenly thought. And he did! After heating it to between 500 and 700° F., a stub of chrome manganese steel was welded onto the broken wedge. An electrode designed for joining high carbon or alloy steels subject to machining and heat treatment was used.

After cooling, the stub was turned and threaded, and installed in the engine. At 9:50 P.M., exactly six hours after shutting it down, the engine was running smoothly again. **Results:** What might have been a big headache was cured at a total shop cost of $3.25, including labor and material. A new wedge would have cost over $60.00 and the engine would have been shut down for not less than three days waiting for it.

A Welded Pile Driver

Road commission of Nemaha County, Neb. could not get delivery, from equipment manufacturers busy on defense work, on a combination pile driver and hoist needed for salvaging bridges washed out in the recent Nemaha River flood. So county commissioners asked for help from F. J. Schmidt, machine shop owner, of Auburn, Neb. Schmidt and his three employees built the entire outfit in their small shop by arc welding ... getting the necessary steel from junk yards or salvaging it from old bridges. The delivered machine cost $5000 under commission estimates for a new one.

Parts for the pile driver and hoist came from varied and amusing places. The main girders of the boom was a leg from an old Nebraska City water tower. Floor deck of solid steel came from a salvaged cemetery bridge. Ladder on the 2000 lb. hammer leads was taken from an old Peru, Neb. water tower. Power take-off was built from used tractor parts and standard Gleaner combine sprockets and chain. Hoist was connected and driven from the Auburn-built power take-off by a four line chain and sprocket combination.

A new feature on this driver was a small hand-operated worm gear hoisting drum which was used to raise and lower the leads as needed for travel of the heavy hammer without changing position of the boom. The hoist, a 2-drum Sterling, was equipped with over 600 feet of cable. All of this equipment was mounted on a large 6-cylinder Diamond-T. The truck motor furnishes power for the hoist, which may be operated in four different speeds controlled by the regular truck transmission. The pile driver head with hammer all folded up under the 25-ft. long boom when in transportation. A folding stiff leg built on the rear of the truck relieves the strain on the springs while the pile driver is in operation.

Only with welding was this small machine shop owner able to produce this useful machine. Many salvaged parts were flame cut to shape and joined by welding to build a lightweight, heavy duty unit.

Keep Cylinders at Work
Return empty cylinders promptly to assure an adequate supply of oxygen and acetylene for use in production for victory
OXYGEN
Return Empties Promptly

A modern all-welded pile driver and hoist which was built from scrap.

Photo by Hobart Bro. Co.

New Product Developments

Expert photography is possible with this simple unit.

Identification Unit

★ **Photographic Equipment, Inc.**, 210 East Parkway, Pittsburgh, has designed a unit to be used for making photographs for industrial plants, schools and stores or other places of business where employee identification is necessary. Known as the **Wim identification unit,** this photographic device is designed to give in a simple manner the same expert adjustment as to lighting, distance and other conditions that an expert photographer needs in taking a picture. However, because of its simplicity it can be operated by anyone. The unit is capable of taking a thousand pictures a day and features automatic focus, timing and light.

» «

Heavy-Duty Clamp

★ A different type of **C Clamp** with claiming non-skid features which prevents skidding when tightening has been designed. The clamp tip is equipped with a bronze bushing in which the end of the heat-treated steel screw rotates. This bushing prevents galling and provides a free movement so that slippage on the work is said to be prevented. The frame, made of cast steel, is available with terminal lug for use on grounding cable during arc welding. A welded T-shaped wrench handle allows a firm grip. Details may be obtained from **Patterson-Ballagh Corp.**, 1900 E. 65th St., Los Angeles.

A clamp of welded design for heavy-duty work.

Precision Limit Switches

★ Class 9007 Type P small precision limit switches have been designed specifically for use where space and operating force are limited on modern machine tools, or as built-in contact mechanisms on other electrical devices. Basic switch units (only 2 in. long by 1 in. square) are enclosed in transparent molded polystyrene cases, sealed against tampering, yet allowing visual inspection of contacts. The operating lever can be adjusted to any position in a complete circle.

15° travel is sufficient to operate the switch and the lever permits an additional 40° emergency over-travel in either direction. A camera shutter type toggle mechanism gives extremely accurate operation with only 2½ oz. force applied to a 1 in. lever arm.

Limit switches for precise work.

Snap action, silver contacts have both A-C and D-C electrical ratings high enough for direct control of small solenoids and contactors as large as Square D Size. IV. Normally open and normally closed circuits are insulated electrically to make unnecessary a common connection between them. Four large terminal screws facilitate connections.

Manufactured by the **Industrial Controller Div., Square D Co.**, 4041 North Richards Street, Milwaukee, Wis.

» «

Finger Guard

★ **Industrial Gloves Co.**, Danville, Ill., announces an efficient type of protector for the thumb and first two fingers in a single unit. It is shown in the accompanying photograph—worked out with a mirror so that the construction of the back, as well as the palm side of the guard is readily seen.

Finger protection where it is needed.

This new guard is designed for punch press work, buffing, grinding, sorting, assembly, inspection, etc., for all jobs where protection is needed only on thumb and first two fingers. The guard is shown made of wool felt—material best suited for handling greasy or oily parts, or as protection against heat in the handling of hot dies, molds, parts, etc. The guard may be had also in chrome leather. In both types, the back is made of elastic webbing which assures the wearer of cool, comfortable fit.

The new **Steel-Grip Triplex Guard** can be purchased as pairs, all rights, all lefts or any combination of rights and lefts as needed at no additional cost.

» «

Seam Welder Controls

★ A new full-electronic timer and control designed for use with seam welders, as well as spot welders is announced by **Weltronic Corp.**, Detroit. When used with spot welding machines, the new **Model 40 Timer** provides both single shot and pulsation type welding controls.

Of the synchronous type, and incorporating phase-shift type heat control, the Weltronic 40 always starts and stops current flow at the zero point of the current wave, while current duration is adjustable to the exact number of cycles desired.

The cabinet housing the control is of the standard Weltronic 4-panel type. Provided in the timer is a built-in tube contactor. The capacity of this contactor is the only necessary variable in the entire control to adapt it to varying capacities of welding operations. A wide selection of electronic contactors is available to suit specific requirements.

Sand to smother bomb blazes is stored in the handle.

Bomb Shovel

★ A new "bomb shovel" invented by two employees of Los Angeles Shipbuilding and Drydock Corp. is being marketed by Industrial Maintenance Engineering Co., Los Angeles.

The shovel carries a load of sand in the handle to smother the blazing incendiary. Sand is automatically released from handle as operator uses hollow side of shovel to smother blazing bomb. Shovel is then turned over and used to scoop up incendiary and remove it to a safe place. It is made of galvanized sheet metal and weighs only 17 lbs when loaded. It can easily be handled by a woman if necessary and can be easily carried to roof or attic.

It eliminates need for sand bucket, spade, hoe or shield. Also effective in smothering oil or gasoline fires around the garage.

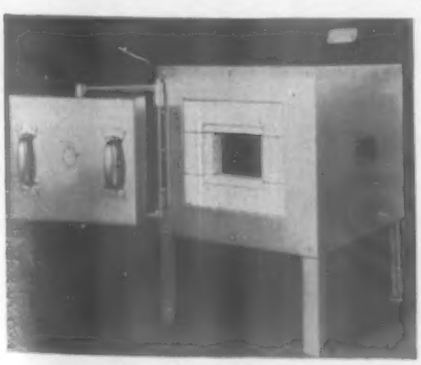
» «

Electric Muffle Furnace

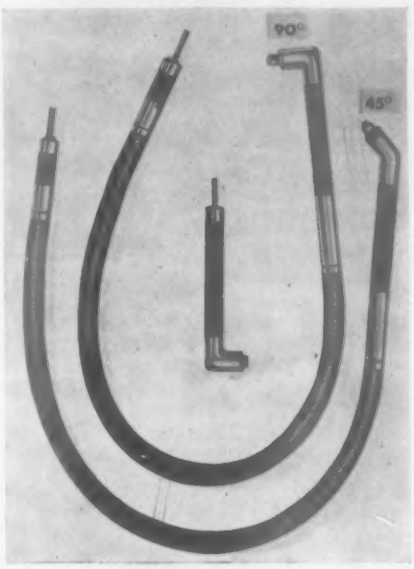
★ The Falcon line of electric Furnaces manufactured by **H. O. Swoboda, Inc.**, 143 Thirteenth Street, New Brighton, Pa., has recently been augmented by a new full muffle electric box type furnace with all refractory hearth.

Designed primarily for fritting and glazing ceramics at temperatures up to 2000°, the new **Falcon BWM Furnace** is also claimed as highly efficient for heat treating high speed tool steels, hardening, tempering, and many other tool room and laboratory heating applications. A desirable construction feature is the new type center pivoted door. Other construction features include a full box type muffle and all-refractory hearth, completely surrounded by heating elements which eliminate temperature variations in the hearth chamber. Chamber dimensions measure 3¾" high, 5¼" wide and 12" deep.

The furnace is available for bench or floor mounting. Capacity provided is 3 KW. Furnace can be furnished for 110 or 220 volts, single phase current. Automatic temperature controls are supplied either mounted directly on the furnace or for separate mounting.



A center pivoted door is the feature of this electric furnace.



These various angle heads require only ⅛ in. clearance.

Flexible Shaft Units

The **Stow Mfg. Co., Inc.**, Binghamton, N. Y., has added two new flexible shaft units to their line of flexible shaft equipment. These heavy duty units are direct drive and are supplied with 45 deg. and 90 deg. angle heads. The outstanding features of these new flexible shaft units is the fact that the head may be removed and fitted directly into a drill chuck without using the flexible shafting. This combination feature makes it possible to do the most awkward drilling job with the greatest of simplicity. The standard length for the shafts of each unit is 30 in. The clearance distance from drill center to outer surface of angle head housing is ⅛ in.

» «

Seam Welders

★ A complete line of **Seam Welders**, in three capacity ranges and 126 models is announced by **Progressive Welder Co.**, Detroit.

In each of the light, medium and heavy duty series, several standard throat depths are available, while each

One of 126 new models of a new seam welder line.

type is available in six different standard drives, three for circular and three for straight seam welding. The Universal model which may be used for both straight and circular welding is also available in three drive types and in each capacity range.

The new Progressive Seam Welders are designer for either interrupted or continuous seam-welding and incorporate all the latest developments in seam welder design. They are attractively streamlined as well as ruggedly built.

Welding heads are designed with full adjustment for wear. All surfaces are lubricated to insure long life and continuous perfect alignment. A special non-ferrous alloy is used to line the cast bearing housing, which is also internally water-cooled. The shaft which this bearing supports is also available water-cooled if desired.

The machines are designed for use of standard RWMA welding wheels, which can readily be adapted to individual applications. They are externally water-cooled. Included in the standard equipment of Provessive seam-welders are a shrouded two-stage foot-switch, air-line lubricator, air pressure regulator, air strainer and a direct reading pressure gauge, solenoid control valve, dual speed control valves.

» «

Flame Cutting Tips

★ Two additions to their line of oxy-acetylene cutting tips have just been announced by Air Reduction. The first, known as **Style 108**, is ideal for working in close quarters. It is bent in an offset shape, to permit cutting along a line 21/32-inch from the vertical centerline of the torch head or barrel. This offset design meets the problem of cutting in close quarters where the radius of the torch head would prevent alignment of the cutting orifice vertically over the desired line of cut.

The Style 108 tip has milled flat sides, with two preheat flames, and is suitable

for either machine or hand cutting operations. It is available at present in sizes Nos. 1 to 3, for cutting steel up to 1½ in. thick.

The other new addition to the line is the **Style 139** straight tip with one preheat orifice, for certain machine or hand cutting operations. This is a companion tip to the recently announced Style 119, which carries two preheat orifices. Made in sizes Nos. 0 to 3, Style 139 is particularly adapted to splitting angle iron, straight-line cutting using a straight edge as a guide, or sheet metal cutting operations, in which light preheat is desired. Further information about these or other tips in the Airco line may be obtained by writing to **Air Reduction**, 60 E. 42nd St., New York, N. Y.

An outstanding safety feature is its danger indicating light.

Insulation Tester

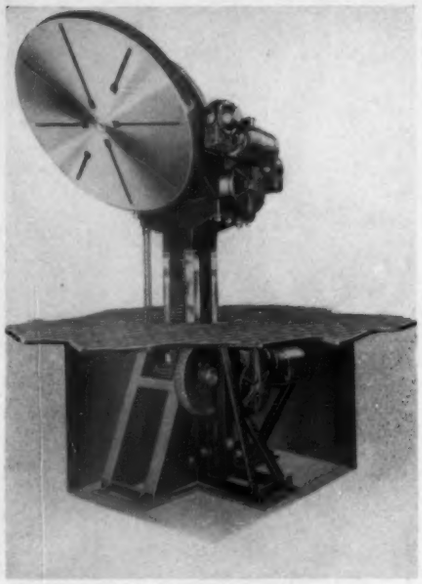
★ The **Superior Instruments Co.**, 227 Fulton St., New York, announces the Model 520 **Insulation and Breakdown Tester** featuring a super-sensitive danger indicator which lights up to indicate leakage up to 1,000 Megohms. Four voltage sources are available, 250, 500, 1,000 and 2,500 volts. The unit will operate on any 90 to 125 volt 60 cycle A. C. line.

This instrument is housed in a portable carrying case with a compartment for test leads and a specially designed cover which may be readily attached to assure complete portability. This model will also indicate shorts and opens and has a safety feature which includes a jewelled pilot lamp on the front panel to indicate when high voltage is on.

» «

Welding Positioner

★ The **Bentley Weldery, Inc.**, Teall Ave. and Riegel St., Syracuse, N. Y., announce a new welding positioner known as the **Model EE-80 Producer.** This unit, which is of all welded construction, has a capacity of 8,000 pounds. A feature of the Model EE-80 Producter is its vertical lift unit which makes it possible to lift the rotating face plate 36 in. above its nominal floor height so as to furnish additional clearance when needed. The face plate is 60 in. in diam. and is supported by Timken thrust bearings at center and a 24 in. dia. ball race or fifth wheel arrangement providing the utmost rigidity. The unit, which is electrically driven, has a tilt and rotation motor of 3 hp. and 1½ hp. motor for the lifting mechanism.

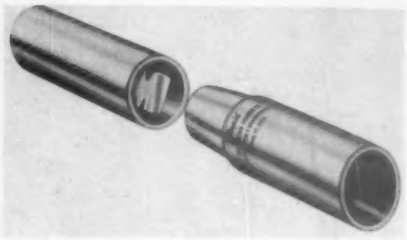


Additional clearance may be obtained through a vertical lift feature.

» «

Cable Connector

★ The **Chicago Tool and Engineering Co.**, 8300 S. Chicago Ave., Chicago, announces a new cable connector which meets Navy requirements and conforms to Navy specifications. This unit, known as the **Rapid Cable and Terminal Connector** is designed to provide rapid connection of welding cable. It features a positive locking device which prevents parting of the connection yet it is waterproof and there are no exposed parts. The connector is of the solderless type and is said to afford the highest possible conductivity due to the combination screw and tapered sleeve construction for holding welding cables.



It meets Navy requirements.

News of the Industry

Those in our Nation's Armed Forces may continue to read The Welding Engineer at the special reduced price of $1.50 per year for the duration.

» «

Welding Engineer Wanted

The **Office of Chief Engineer,** U. S. Army, Washington, is seeking a welding engineer who has a degree in mechanical or electrical engineering with at least six years experience in both gas and arc welding. The man desired will be engaged in development work on semi-portable oxygen and acetylene generating and bottling plants as well as miscellaneous research problems dealing with both gas and arc welding. The salary range for this position is from $3,200 to $3,800 depending upon the qualifications and ability of the applicant.

Address Room 2116 New War Dept. Bldg., Washington, D.C.

» «

Cleveland Bomber Fund

The Greater Cleveland's Fund to Buy a Bomber for MacArthur has been given a substantial boost by the welding industry. One of the larger contributions to the fund was donated by the Employees Association of the **Lincoln Electric Co.** Their contribution was $4,000.00 and was matched by $4,000.00 contributed by **J. F. Lincoln,** president of the company.

The honors for the largest out-of-town contribution have gone to **A. H. Friese,** president of Welding Engineering Co., Milwaukee, who gave $1,000.00.

» «

BUY WAR BONDS

» «

23rd Annual AWS Meeting

The 23rd Annual Meeting of the **American Welding Society** will be held in Cleveland during the week of Oct. 12 to 16, 1942, in conjunction with the National Metal Exposition. The **24th Annual National Metal Congress** will be known as the War Production Edition. As such, it is hoped that it will prove to be a pool of ideas and information. In this manner, it will be possible for the executives of our defense plants to meet and to frankly discuss time saving developments useful in speeding production. Also, it will be possible

for production and process men to obtain information that will result in the speediest possible methods of getting war products into quantity production. Cooperating in the National Metal Exposition this year will be the Wire Association, the Iron and Steel Division and Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, American Society for Metals, as well as the American Welding Society.

» «

The **Welding Engineering Co.**, Milwaukee, announces the opening of a branch office at 837 Gravier St., New Orleans. The New Orleans office is designed to serve the needs of welding users throughout the southern states.

» «

Gas Association Meeting

The **Compressed Gas Banufacturers' Assn., Inc.**, will hold its annual summer meeting at the Seaview Country Club at Absecon, N. J., June 18 and 19. This meeting will be held following an informal dinner to which all members of the association are invited. On Friday, June 19, the annual association golf tournament will be held. There will be a number of prizes in addition to the permanent trophies for which the association members contest annually.

» «

Electrical Engineers Meet

The summer convention of the **American Institute of Electrical Engineers** will be held at the Drake Hotel, Chicago, June 22 to 26.

» «

Radiographers Meeting

The second annual meeting of The **American Industrial Radium and X-Ray Society** will be held at Atlantic City, N. J., during the week of June 22. This meeting will be held in conjunction with the 46th annual meeting of the **American Society for Testing Materials.**

» «

The **Ergolyte Mfg. Co.**, makers of Ergolyte A-C electric arc welders, has just announced the opening of a new plant at 3627 N. Lawrence St., Philadelphia, Pa. The new factory is more than twice the size of the firm's previous Philadelphia plant.

According to John H. Read, company President, the move was necessary to keep up with Ergolyte's round-the-clock production schedules. Mr. Read indicated that a large quantity of new and specialized manufacturing and testing equipment has been developed and installed especially to speed production of welding machines.

» «

The 15th Semi-Annual Meeting of the **Eastern Photoelasticity Conference** will be held on Sat., June 20, 1942, at The University Club, 40 Trinity Place, Boston, Mass.

All inquiries should be addressed to W. M. Murray, Room 1-321, Massachusetts Institute of Technology, Cambridge, Mass.

Twice the Mileage

Results from Application of Amsco Economy Hardface . . . . . .

Increasing the mileage is the need of the hour, whether it is in tires on your car, sprockets on your tractor or other equipment wearing parts. It is our job, yours and mine, to *Increase The Mileage* and to aid the war effort by conserving existing equipment and reducing production of parts that divert essential materials. Amsco's Welding Products have conservation and reclamation as their objective. We present a real "find" in conservation which may prove helpful in "Increasing Your Mileage."

The crawler tractor sprocket shown has already been built up three times with Amsco Economy Hardface which again has lived up to its name. *Each rebuilding gave nearly twice the service* of a new sprocket under the severe conditions found in construction grading. That adds up to six times the mileage given by a new part at far less than six times the cost — and further reclamation is possible. That, you will agree, is conservation.

How To Do It

Remove all laminated or mushroomed metal from the worn sprocket teeth; provide a metal template which will indicate the contour of the teeth on a new sprocket, including enough teeth to maintain uniform pitch. Build up both sides of the teeth with a high carbon or low alloy electrode to within 1/8" of the template size, and over this deposit apply one layer of Amsco Economy Hardface electrodes to fit the template. This gives the hard, abrasion-resistant surface necessary for wear resistance and, because Economy Hardface applies smoothly, the proper tooth contour can be acquired without grinding or other finishing operations. The Economy Hardface deposit has the ability to polish in service and on this account galling and seizing are reduced to a minimum, and service increased to a maximum.

Send for Bulletin No. 941-W

Points the way to "increased mileage" for every industry using heavy-duty ferrous equipment parts which are subjected to shocks, heavy loads and abrasion. Suggests how to forestall wear by hard-facing new parts and how to reclaim worn parts by restoration with Amsco build-up materials.

Amsco

AMERICAN MANGANESE STEEL DIVISION
OF THE AMERICAN BRAKE SHOE & FOUNDRY CO.
Chicago Heights, Illinois

- Manganese Steel Castings for shocks and abrasion.
- Chromium-Nickel Alloy Castings for heat and corrosion resistance.
- Power Shovel Dippers. Dredge and Industrial Pumps.
- Welding Materials for reclamation and hard-surfacing.

FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO. OFFICES IN PRINCIPAL CITIES

The 600 employees of **Handy & Harman** were guest at the 75th Anniversary Banquets held by that company in Bridgeport and New York May 14th and 15th. The banquets were attended by company officials and all employees. G. H. Niemeyer, President, presided at both and presented service awards to all who had served the company for more than 10 years. A testimonial was presented to Mr. Harry H. De Loss, former Vice-President of the company.

Of the 68 to receive awards at Bridgeport, 14, led by R. H. Leach, Vice-President, who directs manufacturing, refining and research at the Bridgeport Plant, were presented with gold watches in recognition of 25 years or more of faithful service. Likewise, in New York, watches were awarded to G. H. Niemeyer, President, C. W. Handy, Chairman, Howard W. Boynton, Treasurer, H. Walter Spaulding, Secretary, John Gunther, E. J. Hughes and William Bechtold.

The speakers at Bridgeport were Mayor McLevy of Bridgeport, First Selectman John Ferguson of Fairfield and Carroll B. Huntress, Vice-President of Republic Coal & Coke Company, all of whom expressed surprise at the volume of war production being carried on in the company's plant.

At New York, Mr. Niemeyer spoke on the "Penalties of Leadership." Mrs. Nellie Tayloe Ross, Director of the Mint, won the hearts of the ladies present in her talk on "The Time of Opportunity for Women" and Dr. Allen A. Stockdale, principal speaker, brought home forcibly that we have many "Things Worth Defending."

SKILSAW SANDERS
give production
the SPEED that leads to
VICTORY!

SKILSAW MODEL "SL" SANDER-GRINDER. Grinds down fins on steel castings, smooths down welding beads.
SKILSAW MODEL "B" BELT SANDER Cleans up castings, speeds up sanding. Powerful vacuum system picks up all dust.
SKILSAW "ZEPHYRPLANE" BELT SANDER. Swiftly removes scale and grit from flat surfaces of metals, wood and compositions.
SKILSAW MODEL "N" DISC SANDER. Quickly removes fins and scale from gray iron castings. Buffs and polishes.
• Minutes were never before so precious...and SKILSAW SANDERS never so important as they are today. That's why you'll find them in America's busiest war-work plants...right at the front in the battle of production. 6 SKILSAW DISC SANDER Models to speed up all sanding, cleaning, grinding on flat, concave or convex surfaces. 4 SKILSAW BELT SANDER Models to do all sanding and polishing on flat surfaces...10 times faster than by hand. Ask your distributor for a demonstration.
SKILSAW, INC.
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New York • Boston • Buffalo
Philadelphia • Cleveland
Detroit • Indianapolis
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Atlanta • New Orleans
Dallas • Los Angeles
Oakland • Seattle
Toronto, Canada
SKILSAW PORTABLE ELECTRIC TOOLS
★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

Personals

Linde Air Products Co. advises that J. A. Rea has been promoted from service engineer in the Cleveland sales office to supervisor of process service in the Indianapolis district office.

» «

Appointment of **Gerald Z. Wollam** as works manager of the new war production plant of the Westinghouse Elec. and Mfg. Co., Sunbury, Pa., was recently announced by Walter C. Evans, general manager of the Company's Radio, X-Ray and Broadcasting Divisions.

» «

The election of **A. J. Moses** as a vice president of **Combustion Engineering Co., Inc.** was announced following recent action by the Board of Directors.

Mr. Moses, a graduate of Georgia School of Technology, has been connected with Combustion Engineering Co., or its constituent companies, since 1920 and for several years past has been General Manager of the Company's Hedges-Walsh-Weidner Div., Chattanooga. He will continue to be responsible for operations of this major manufacturing division which is now engaged almost entirely in production related to the war effort.

An authority on welding and X-raying, Mr. Moses is the author of numerous articles and society papers on welding and the fabrication of welded pressure vessels. His technical society memberships include the American Society for Testing Materials, the American Welding Society and the Chattanooga Engineers Club, several of which he has served on important committees.

» «

Election of four Westinghouse executives to the rank of vice president is announced by Westinghouse Elec. & Mfg. Co.'s Board of Directors. They are **Andrew H. Phelps**, Pittsburgh, manager of purchases and traffic; **L. E. Osborne**, Philadelphia, manager of the steam division; **Frank C. Reed**, Jersey City, N. J., president of the Westinghouse Electric Elevator Company, a subsidiary; and **Walter C. Evans**, Baltimore, Md., general manager of radio, x-ray and broadcasting divisions. All the new vice presidents will continue in their present executive posts.

» «

Henrik Ovesen, until recently Chief Engineer for the Division of Contract

(Concluded on Page 58)

The Welder's Table of Metals

METAL	Melting Point—Degrees Fahr.	Linear Expansion per 10 ft. Length per 100 Degrees Fahr. Rise in Temperature in Inches	Heat Conductivity British Thermal Units per Hour per Sq. Ft. per Inch of Thickness per Degree Fahr.	Weight—Pounds per cu. Inch	Shrinkage Allowance in Castings Inches per Foot	Brinell Hardness Hard	Brinell Hardness Soft	Approximate Tensile Strength Pounds per Sq. In.	Special or Patented Alloy Manufactured by	Approximate Analysis Per Cent Chemical Symbols	Remarks
Allegheny Metal	2640	0.115		0.282			146	90,000*-120,000	Allegheny Steel Co.		*Annealed
Aluminum—Cast—8% Copper	1175				0.1875			20,000		Al, 92; Cu, 8	
Aluminum—Pure	1218	0.143	1393	0.096		40	23	12,000-28,000		Al	
Aluminum—5% Silicon	1117	0.146		0.093				18,000	Alum. Co. of America	Al, 95; Si, 5	
Ambrac—A	2100	0.109		0.310				50,000-130,000	American Brass Co.	Cu, 75; Ni, 20; Zn, 5	
Antimony	1166	0.076		0.245				1,000		Sb	
Bismuth	520									Bi	
Boron	3992			0.094						B	
Brass—Commercial High	1660	0.115	756	0.306	0.1875			46,000		Cu, 66; Zn, 34	
Bronze—Tobin	1625	0.119		0.304				64,000	American Brass Co.	Cu, 60; Zn, 39; Sn, 1	
Bronze—Munts Metal	1625									Cu, 60; Zn, 40	
Bronze—Manganese	1598	0.119		0.302			95	60,000	A. B. Co.		
Bronze—Phosphor	1922	0.119		0.321		160	100	45,000	A. B. Co.	Cu, 96; Sn, 3.75; P, 0.25	
Cadmium	610									Cd	
Carbon	6332†									C	†Greater than
Chromium	3740			0.235						Cr	
Cobalt	2700	0.082		0.312				24,400		Co	
Copper—Deoxidized	1981	0.118		0.307	0.25			32,000-55,000		Cu, 99.99	
Copper—Electrolytic	1981	0.106	2640	0.322		107	42	20,000,70,000		Cu, 99.93; O, 0.07	
Duriron	2310	0.104		0.253	0.1875				Duriron Co.	Si, 14.5; C, 0.85; Mn, 0.35; Fe, base	Acid resisting iron
Everdur	1866	0.113	371	0.306	0.1875	180	80	52,000-100,000	American Brass Co.	Cu, 94.8-96; Si, 3-4; Mn, 1-1.2	
Gold	1945	0.094	2046	0.697				14,000		Au	Wt. Cast 0.294 lbs. cu. in.
Iron—Cast	2300	0.067	338	0.260	0.125		193	15,000			
Iron—Malleable	2300			0.268	0.125			53,000			
Iron—Pure	2786	0.078	467	0.283			84	38,500		Fe	
Iron—Wrought	2900	0.078	419	0.278			90	48,000		Fe & Slag	
Lead—Pure	620	0.181	240	0.411	0.312		6	1,780		Pb	
Lead—Chemical	620	0.193		0.410	0.312			1,780		Pb, 99.92; Cu, 0.08	
Manganal	2450								Stulz-Sickles Co.	C, 0.60-0.85; Mn, 11.0-13.5; Ni, 2.50-3.50; Si, 0.60-0.95; Fe.	
Manganese	2246			0.268						Mn	Welding Rods]
Molybdenum	4532		100	0.309				42,500-154,000		Mo	
Monel Metal	2450	0.093	174	0.318		190	105	79,000-109,000*	International Nickel	Ni, 67; Cu, 28; Fe, Mn, Si, C, S	*Sheets from soft to full hard
Nichrome	2460	0.091		0.295				100,000	Driver-Harris Co.	Ni, 60; Fe, 24; Cr, 16; C, 0.1	
Nickel	2646	0.083	413	0.319	0.25		112	61,000-109,000*		Ni	*Sheets from soft to full hard
Nickel Silver—18%	1955	0.122		0.309		158	77	58,000-95,000		Cu, 65; Ni, 18; Zn, 17	
Platinum	3218						65			Pt	
Silicon	2588									Si	
Silfram						437			Stoody Co.	Cr, 31.75; Ni, 10; C, 2; Si, 4.75; Fe	Welding Rods
Sil-Fos	1300						65	33,000*	Handy & Harman Co.	Ag, 15; Cu, 80; P, 5	Welding Rods
Silver—Pure	1762	0.126	2919	0.380						Ag	*Joint]
Steel—Hard (0.40-0.70% Carbon)	2500	0.076	312*	0.283		590	240	36,000			*1% Carbon
Steel—Low Carbon (less than 0.15%)	2700	0.076		0.283			138	75,000			
Steel—Medium (0.15-0.40 Carbon)	2600	0.076		0.283			180	50,000			
Steel—Manganese	2450					255		60,000			
Steel—Amsco Nickel Manganese	2450							70,000-100,000		C, 1.0-1.45; Mn, 12-15; Si, 0.10-0.20; Fe	
Steel—Nickel—3½%	2600			0.284				Amer. Manganese Steel		C, 1.3; Mn, 14; Ni, 5; Si, 0.35; Fe	Welding Rods
Steel—Cast	2600			0.282	0.25		144	80,000		Ni, 3.25-3.75; C, 0.15-0.25; Mn, 0.50-0.80	
Stainless Steel—18-8	2550	0.072		0.279			140	88,000			
Stainless Steel—18-8 Low Carbon	2640			0.280			140	89,000-100,000		Cr, 18; Ni, 8; C, 0.16; Fe, base	
Stellite	2305*	0.105		0.307		532		80,000*		Cr, 18; Ni, 8; C, 0.07; Fe, base	*Annealed
Stoody Self Hardening Metal						495		47,000-105,000	Haynes Stellite Co.	Co. 43-55, W, 11-14; Cr, 25-34	*Average
Stoodite						578			Stoody Co.	Cr, 7; Mn, 4; C, 1.0; Si, 1.25; Fe, 86.75	
Tin	450	0.139	450	0.263	0.083		15	5,000	Stoody Co.	Cr, 29.5; Mn, 3; C, 2; Si, 2; Fe, 58.5	Welding Rods
Timang	2450									Sn	
Tungsten	6152		1381	0.678			442		Taylor-Wharton Iron & Steel Co.	W	*Cannot be melted with torch
Tungsten Carbide	*					91†					†Moh's scale]
Vanadium	3182			0.199						V	
Zinc—Cast	786	0.169		0.243	0.312		45	9,000		Zn	*Av. hard rolled
Zinc—Rolled	786	0.169	770	0.258				31,000*		Zn	

Personals

(Concluded from page 54)

Distribution, OPM, has joined Lukens Steel Co., Coatesville, Pa., as Consulting Engineer. Mr. Ovesen will supervise certain engineering and construction to be carried out in connection with the war program. He was released by OPM to assume this position.

Born in Copenhagen, Denmark, Mr. Ovesen received a degree in Mechanical Engineering from the Polytechnic Institute of Copenhagen. In 1925 Mr. Ovesen joined Youngstown Sheet and Tube Co., Youngstown, Ohio, as Chief Engineer with which he was connected until 1935 when he engaged in consulting engineering work. He has supervised construction of several steel mills both in this country and England.

Scully Steel Products Co. today announced the appointment of **H. J. Mokate** as assistant to vice president and **Andrew Verschuur** as manager of sales, Chicago district.

Mr. Mokate was first employed by the American Sheet and Tin Plate Company in 1920 and served in various capacities with that company until 1936 when it became a part of Carnegie-Illinois Steel Corp. He was appointed resident salesman at Rockford, Ill. at that time and a year later came to Chicago as supervisor of secondary products. In 1940 he was made manager of sales, secondary products division, with offices in Pittsburgh, where he remained until his present transfer to Scully Steel Products Co.

Mr. Verschuur began as an office boy in 1894 with the Scully Steel and Iron Co., Chicago. He was made assistant manager of the order department in 1897 and two years later became manager of this department. In 1904 he took over the duties of sales correspondent and remained in this capacity until 1912 when he was appointed assistant manager of sales. He became assistant general manager of sales, Illinois-Scully Steel Warehouse Co., Chicago, in 1931 and continued in this position when the company became Scully Steel Products Co. two years later. He has been assistant general manager of sales since that time.

» «

McClure Kelley, who began his association with the Company in 1929 as Assistant Treasurer, becoming Treasurer in 1931 and Vice-President and Treasurer in 1940, has been elected President of the **Western-Austin Co.,** Aurora, Ill., by the Board of Directors. Mr. Kelley succeeds to the Office on August 1, at which time **Samuel F. Beatty** will become chairman of the Executive Committee. Mr. Beatty has been associated with the Company for 43 years, the last 8 years as President.

» «

Harold P. Blum has been appointed by the Metal & Thermit Corp. as its Cleveland territory representative to handle sales and service of the Murex line of arc welding electrodes. Mr. Blum, whose offices are located at 1615 Collamer Avenue, will continue to represent Una Welding, Inc., with which he has been connected for several years, on automatic welding equipment.

» «

C. R. Owens and **R. W. Steenrod** have been appointed Welding Specialist and Industrial Heating Specialist, respectively, of the General Electric Pacific District. **E. J. Cipperly** will continue as Industrial Heating and Arc Welding Specialist at the Los Angeles Office.

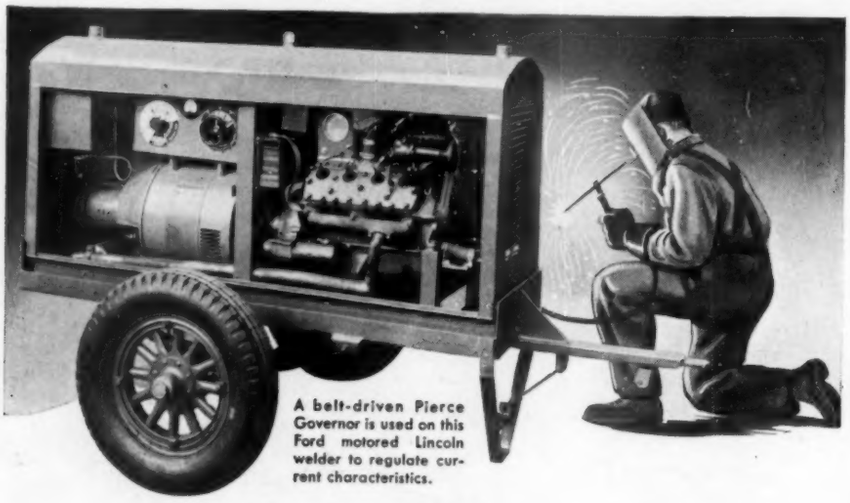
Mr. Owens, a native of Chico, Cal., was graduated from the California Institute of Technology and has been with General Electric since 1923. Mr. Steenrod is a native of Maplewood, Ohio, was graduated from Ohio State University, and joined General Electric in 1933.

» «

John J. Fitzgibbon has changed positions from Foundry Engineer for The Whitehead Metal Products Co., New York, N. Y., to Metallurgist for R. Hoe & Co., Dunellen, N. J., effective May 11.

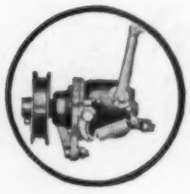
» «

Robert C. Onan, Lindberg Engineering Co., Chicago, has been appointed District Sales Manager for the Northern Illinois, Iowa, Wisconsin, and Minnesota territory. The newly opened Lindberg office is at 606 West Wisconsin Avenue in Milwaukee.



A belt-driven Pierce Governor is used on this Ford motored Lincoln welder to regulate current characteristics.

ANOTHER PIERCE-GOVERNED UNIT ON THE JOB TO *Beat the Axis!*



To be sure of the weld, be sure of the governor. Specify Pierce Flyball Governors when you buy welders.

IMPORTANT NOTICE

Because of Pierce's "all-out" participation in the national war effort, it is extremely difficult to ship your order promptly without a preference rating certificate. We are sure that those friends who are unable to obtain governors will understand our inability to serve them as usual. Should you have governors that need servicing, send them in, along with the necessary repair and maintenance certificate, and the repairs will be made promptly.

● Somewhere in Canada, this Pierce-governed Lincoln welder is serving the Naval Defense Department in important, secret work, aimed at beating the Axis! It is just another instance of Pierce Governors doing their bit in many fields!

For strong, clean, leakproof welds—made quickly and surely—positive engine regulation is essential. Pierce Flyball Governors *unfailingly* hold the arc constant, and give split second recovery of current characteristics—within 3/10 second after striking arc. That's why Pierce Governors are standard equipment on most engine-driven welders!

THE PIERCE GOVERNOR COMPANY
1607 Ohio Avenue, Anderson, Indiana

Pierce Governors
STANDARD SINCE 1913

Current Reviews

"Elimination of Oxygen Waste" Campaign

As part of a campaign against waste of oxygen in welding and cutting operations, two posters for display in plants where oxy-acetylene processes are used have been made available. Both posters dramatize oxygen's importance to war production and emphasize the need for conservation. Eye-catching colors and illustrations give both pieces high attention value.

No advertising appears on either poster. Light weight paper stock permits easy mounting anywhere in the shop. Write for free copies which will be sent postpaid in any quantity desired. Address G. Van Alstyne, **Air Reduction Sales Co.**, 60 E. 42nd St., New York, N. Y.

Welding Timer Booklet

Sequence and automatic weld timers, which increase weld production and reduce outage time, are described in a new 6-page booklet announced by the **Westinghouse Electric and Mfg. Co.**

The illustrated booklet gives application information and special design features. Also diagrams showing complete sequence of operation in pulsation welding and how the electronic timer and other controls fit into the average resistance welding circuit.

The electronic timer is designed for resistance welders using air or hydraulically operated electrodes, with solenoid operated valves. Timing panels are available as either automatic weld timers or sequence timers.

These timers are adaptable for controlling spot, butt and projection welders. Sixteen models conforming with NEMA standards are housed in duplicate standard cabinets. Two tables are given, one for automatic weld timers, and the other for sequence timers. These tables give the NEMA type number, type of welding, operation, timing function, and rating.

A copy of **booklet B-3079** may be secured from department 7-N-20, Westinghouse Electric and Mfg. Co., Pittsburgh, Pa.

Electrical Catalog

A new 16-page catalog listing over a thousand stock items in Rheostats, Resistors, Tap Switches, Chokes and Attenuators has been issued by the **Ohmite Manufacturing Co.**, Chicago. This new **Catalog 18** is a quick-reference specification or buying guide. It gives illustrations, descriptions, ratings, prices and other helpful information on the wide range of Ohmite stock types and sizes.

A free copy of the new Catalog 18 may be obtained by writing to the Ohmite Mfg. Co., Dept. 3C, 4835 Flournoy St., Chicago.

Defense Bulletin

Essential emergency equipment for plant protection and public safety departments is completely described in a new 8-page fully illustrated **Defense Bulletin** just issued by the Mine Safety Appliance Co. This bulletin covers the complete range of safety equipment needed during war time. It includes descriptions of gas masks, helmets, gas protectors, inhalators, asbestos suits and a complete line of first aid equipment. In addition, the bulletin introduces three new items, the M.S.A. steel helmet, the M.S.A. first aid belt and the M.S.A. combination traction splint.

Copies of this new defense bulletin No. G-5, may be secured from the **Mine Safety Appliances Co.**, Braddock, Thomas and Meade Sts., Pittsburgh. Ask for No. G-5.

Welder Bulletin

Greyhound Electric Mfg. Co., Inc., Brooklyn, N. Y., has released a 6-page bulletin describing the various A-C welders manufactured by this company. In addition to giving detailed specifications of the various welders, the important engineering features of this line of equipment are also pointed out. These welders, which range in price from $69 to $395, are sold subject to an unconditional guarantee for 5 years, so it is stated in the bulletin.

Gage Care Bulletin

The George Scherr Co. offers a four-page booklet entitled **"The Care of Gage Blocks"** which reveals up-to-date methods of increasing the usefulness and life of gage blocks. During these

(Continued on page 60)

ALL DOWN-HAND WELDING

Photograph shows Model C-F Positioner with weldment tilted 135°

With convenient push-button control in one hand and rod in the other the welder is taking advantage of two important features of C-F Positioners; tilting to the proper angle for down-hand welding and using variable speed rotation for laying the fillet. One "set up" on the machine positions this circular weldment or *any size or shape* of assembly for *all* down-hand welding. This kind of "production-line" welding is faster, safer and better and there are C-F Positioners to accommodate weldments from 1200 to 14,000 lbs.

CULLEN-FRIESTEDT CO.,
1309 S. KILBOURN AVE. CHICAGO, ILLINOIS

Current Reviews

(Continued from page 59)

times when there is a shortage of gages and precision tools every toolmaker and mechanic who works with precision length standards can gain information from this study. Copies may be obtained upon request from the **George Scherr Co.**, 128 Lafayette St., New York.

» «

Machining Data

"DoAlls on Production" is the title of an attractive plastic-bound catalog now being issued by Continental Machines, Inc., 1306 S. Washington Ave., Minneapolis, Minn., containing a story in pictures of the DoAll Contour Machine for band sawing, band filing, and band polishing. The catalog is divided into nine parts.

Book One describes and illustrates the use of DoAll Contour Machines in plants engaged in the manufacture of various types of guns, airplanes, and other armament. Book Two is devoted to "three dimensional" contour sawing by means of DoAll machines in various plants and factories. Book Three shows and describes the use of DoAlls for producing small quantities of stampings without the aid of dies. In Book Four, special fixtures for handling production jobs on DoAll Contour Machines are shown and their uses on DoAlls in various plants described and illustrated.

Continuous filing operations performed by DoAll machines on various production jobs are illustrated and described in Book Five of the catalog. Book Six treats special work handled by DoAll Contour Machines and Book Seven covers contour sawing operations as performed on DoAlls in numerous plants for the manufacture of jigs and templets, die parts, spring parts, tools and parts for plane production, and so on. Attachments for greater DoAll versatility are illustrated and described in Book Eight, and in Book Nine, the outstanding features of DoAll Contour Machines are treated by means of illustrations.

Copy of catalog is available free of charge to plant engineers planning production and to instructors in vocational, N. Y. A., and defense training programs.

» «

Forged Specialties Catalog

Complete engineering data on Lenape "Red Man" welding necks, nozzles, elliptical handholes and man holes, forged specialties, is contained in **Composite Catalog 842** which has just been published by Lenape Hydraulic Pressing and Forging Co.

These products are used extensively by equipment fabricators to the petroleum, ship building, power, and chemical industries. Catalog 842 has been prepared as a reference manual to cover all standard and many special applications. Resquests for a copy should be sent on company letterhead to: Lenape Hydraulic Pressing & Forging Co., P. O. Box 4013, West Chester, Pa.

» «

Air Safety

The four page pamphlet **"Horse Sense"** was prepared for Industrial Engineers interested in production as well as safety. It gives valuable information on equipment which will reduce accidents through the intelligent use of compressed air. The Safety Installations described are not only easy to install and operate, but the most interesting point is that they increase production. It is available by writing to A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn, N. Y.

» «

Operator's Guide Book

A new guide book for Doall operators entitled, **"A Chalk Talk on 40 Different Ways to Cut Machining Costs,"** is now available from the **Continental Machines, Inc.**, Minneapolis.

This 48-page book is profusely illustrated and shows the way that experienced Doall operators have saved time and metal in their Doall operating practices. Each illustration is a chalk talk explanation concerning such operations as how to stack parts in making the stampings without dies, welding the band saw, how to grind and readjust the band saw guides, the use of mirrors in filing operations, etc. Anyone who operates the Doall machine would profit by securing a free copy of this guide as a reference for short cuts in his operation of Doall contour sawing machine.

» «

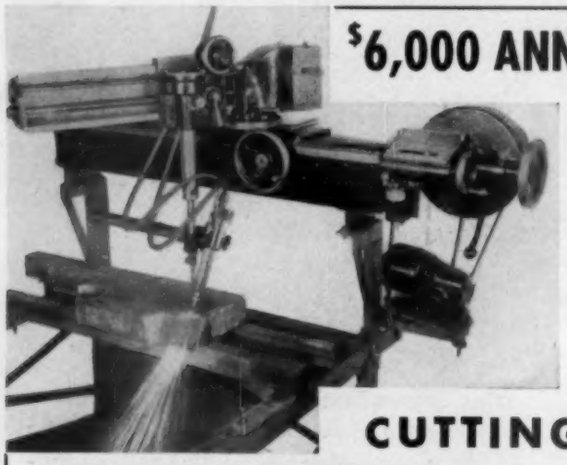
Hard-Facing Data

In a new booklet recently released by the **Stoody Co.**, Whittier, Cal., entitled, **"Hard-Facing—Industry's Weapon Against Wear,"** there is explained how various hard-facing alloys are being used in the industry to save time, reduce operating costs and preserve steel. Practically all industries are treated in this 16-page booklet with special emphasis on; petroleum, steel, lumber and paper, brick and clay, agriculture, dredging, foundries, and mining. Copies are available to all persons interested in hard-facing.

» «

Welding Technique

In an 18-page booklet entitled, "'Fleet-Fillet' Welding Technique for Speeding War Production," there is described the fleet-fillet technique of arc welding which is said to permit up to 100% faster fillet welding. This booklet, which contains many illustrations including photos and line drawings, is planned as ready reference material for plant production officials, welding operators and others concerned with welding. The bulletin which is concisely written discusses faster welding production without increasing oper-



$6,000 ANNUAL SAVING!

That's the Record of ONE MACHINE IN ONE TOOL ROOM

The NEW SCHOITZ *Flame* CUTTING MACHINE

Reduce machine finishing operations — sawing, drilling and milling — to a minimum. With a SCHOITZ you save on both material and labor —both time and money.

Save critical tool steel and avoid delays in getting proper material. Cut down your shaving piles and resulting high labor costs. A few sizes of steel plate replaces large inventory of bar steel-flats and rounds. With a Schoitz Cutting Machine you always have the right size for the job.

Pays for itself—even in small shops—in less than a year.

IMMEDIATE DELIVERY—GET DETAILS

Write today for new folder giving all data and useful information regarding chart and indicator giving proper cutting speed in sizes and working pressure for any thickness material.

√ Saves Time
√ Avoids Delays
√ Reduces Costs

Typical Time Savings With the Schoitz Flame Cutter

Chuck Jaw—2½ hrs. to 6 min.
Jig Plate—4 hrs. to 8 min.
Face Plate—3½ hrs. to 20 min.
Tool Block—3 hrs. to 10 min.
Vee Block—2 hrs. to 7 min.
Stripper Plate—5 hrs. to 15 min.
Bolster Plate—4½ hrs. to 11 min.
Heel Clamp—2 hrs. to 6 min.
Gear Blank—3½ hrs. to 7 min.
Die Shoe—5 hrs. to 14 min.

SCHOITZ ENGINEERING WORKS

221 W. SIXTH STREET **WATERLOO, IOWA**

ator fatigue, reduction in the amount of welding electrode per foot of weld and lower welding cost. Copies of Bulletin 432 are available without cost from **The Lincoln Electric Co.,** Cleveland.

» «

Wall Chart Wire Data

A wall chart which incorporates much basic and frequently used wire data is being offered without charge by the Callite Tungsten Corp., to engineers and specifiers of wire and wire products.

The data presented consists of three tables. The first of these gives wire diameters for all sizes from 1 to 50 in B & S, Washburn & Moen, and Stubs (or Birmingham) gauges, and in addition includes feet per pound for each size in the B & S gauge. These latter figures are given for 5% phosphor bronze wire. The second table supplies the conversion factors to simplify calculating feet per pound for wire of 15 different common metals and alloys. Third is a table showing the composition and physical properties of this same group of metals and alloys.

Engineers and others having use for one of these charts may obtain same by addressing a request to the company at Union City, N. J. There is no charge or obligation involved.

» «

Steel Manual

Another section of the **Steel Products Manual, Section 2,** covering carbon steel semifinished products, has been released by the **American Iron and Steel Institute.**

This 30-page booklet is divided in two parts, the first of which discusses definitions, classifications and manufacturing practices in the production of carbon steel semifinished products. In part 2 standard steels, methods of identification and restricted requirements are discussed. There is included a number of tables showing the variations permissible for check analysis of steels. The booklet is closed with a discussion as to standard methods of sampling and a glossary of metallurgical terms.

Additional copies of Section 2 may be secured from the Institute at 350 Fifth Avenue, New York, for the cost of 25c.

» «

Connector Bulletin

The Dallett Co., Philadelphia, has just released a 6-page folder describing Dalweld detachable cable connectors. These connectors, which are available in two sizes, 400 and 600 amp. respectively, are capable of handling cable sizes from 0 to 0000. They are also available in both solderless and soldered connection types.

The outstanding features of the **Dalweld Connector** are the fact that they may be instantly connected or disconnected by a quarter turn of the connector. An expander type plug insures maximum conductivity for any size cable or amperage employed in electric arc welding.

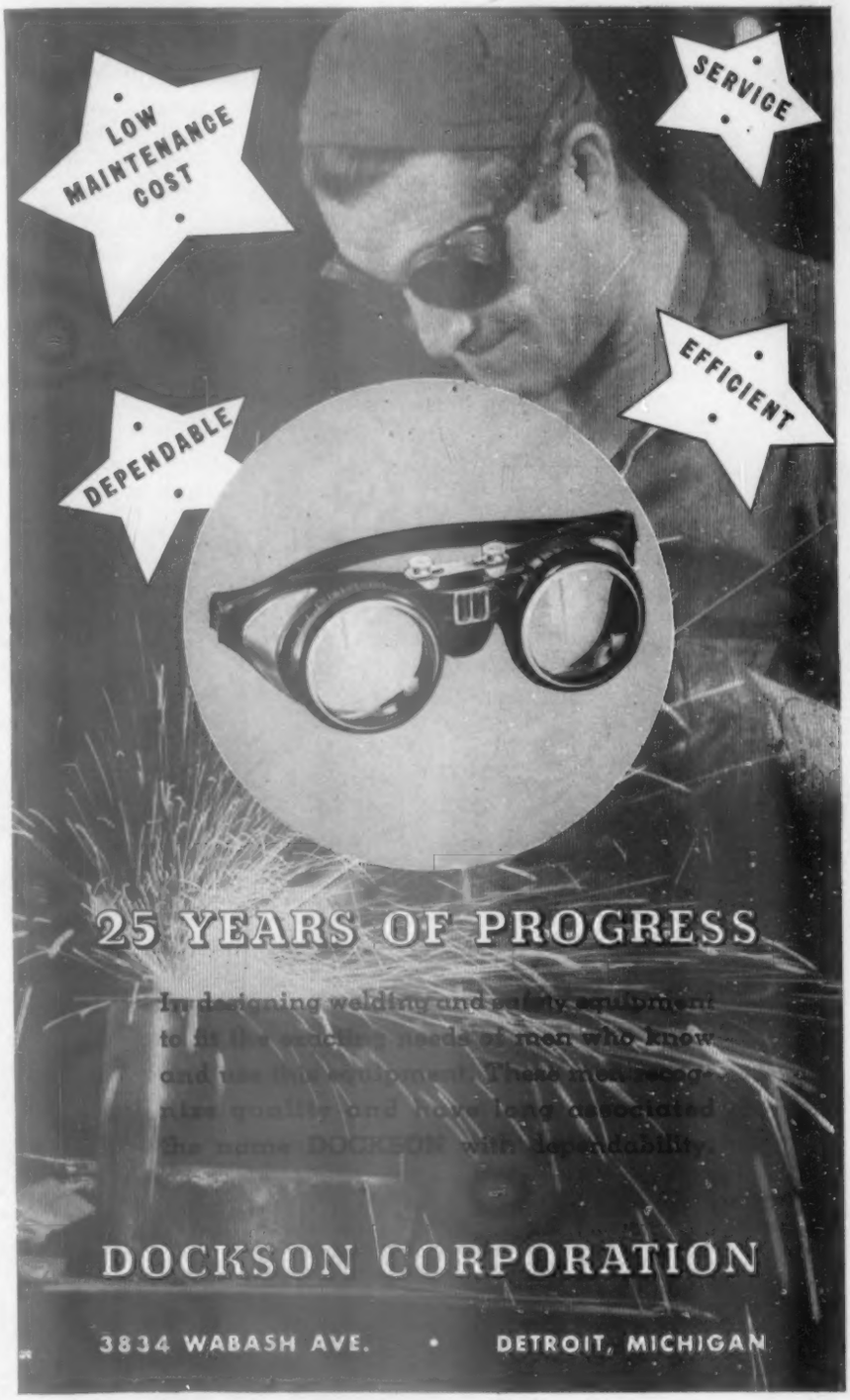
Screw Thread Standards

The American Standards Association has recently approved an American Standard of major interest to industry's war production efforts. This is the American Standard for Acme and Other Translating Threads, **(B1.3-1941).**

Four series of translating screw threads are covered in the standard: general purpose Acme threads, with an angle of 29° between the sides of the thread; the 29° stub thread; the 60° stub thread; and a modified square thread with a 10° angle between the sides of the thread.

Industrial applications of these threads are many. They are used in lathe dogs and clamps, track drills, steel bench vises, machine tool vises, drill press vises, lifting jacks, steel hand clamps, valve stems, piano stools, cross feed screws for lathes, letter copy presses, and elevating screws on machine tools and other machinery. Acme threads are also used in several types of war equipment. Because of the importance of this standard in the war effort the British Standards Institution is considering adoption of this standard.

Copies of the standard on Acme and Other Translating Threads are available from the **American Standards Association,** 29 W. 39th St., New York, at 45 cents a copy.



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Metallurgically Correct for Atomic Hydrogen Welding

The success and economy of atomic hydrogen welding depends greatly upon the quality of the tungsten electrodes which sustain the arc.

You can now obtain electrodes of chemically pure tungsten, uniform in physical structure, slow burning under the intense heat of the arc. They are straight, clean, true in diameter, all of which helps sustain an even, non-sputtering arc with controlled temperature at the weld.

Write today for Bulletin W-421. This bulletin contains full information and specifications on tungsten electrodes of unexcelled quality.

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4237

VASCOLOY-RAMET CORPORATION
Sole Distributor
NORTH CHICAGO, ILLINOIS
DISTRICT OFFICES IN PRINCIPAL CITIES

Recent Patents

Electric Deseaming

2,284,351. **Richard F. Wyer,** Scotia, N. Y., assigned to General Electric Co., Schenectady, N. Y. Filed Aug. 17, 1938. Issued May 26, 1942. The method of deseaming a billet which comprises connecting the terminals of a source of arcing current to said billet and to an electrode, maintaining an arc between said electrode and said billet, traversing said arc along a defective portion of said billet in a direction away from the terminal connection with said billet, and inclining said electrode away from the direction of arc travel at an angle of from 30° to 45° with said billet to expel from the arc crater in said billet the current conducting metal rendered molten by said arc.

» «

Apparatus for Cutting or Deseaming Metal

2,284,574. **Wilgot J. Jacobsson,** Plainfield, N. J., and **Cecil V. Eskridge,** Chicago, Ill., assigned to Oxweld Acetylene Co. Filed May 4, 1940. Issued May 26, 1942. A blowpipe for cutting or deseaming metal and having, in combination, a cutting oxygen supply valve; a starting rod feed mechanism; means, including an air supply valve, for discharging an auxiliary jet of air for blowing slag formed during a cutting operation; and a common control lever for operating in succession the feed mechanism, the cutting oxygen supply valve and the air supply valve.

» «

Cutting Machine

2,283,345. **Lloyd W. Young,** Scotch Plains, N. J., assigned to Oxweld Acetylene Co. Filed April 26, 1940. Issued May 19, 1942. A torch mechanism which comprises a frame adapted to be mounted in operative relation to a work surface; a pair of crank arms mounted for rotation with respect to said frame about spaced parallel fixed axes; a link member connecting said crank arms, said link member being pivoted to the outer portions of said arms; a blowpipe; and means for holding the torch on the connecting link member, the longitudinal axis of the torch being transverse to the main axis of said link member and to said fixed axes; the construction and arrangement being such that the pivot connection of the link member to crank arms are constrained to move in arcs only on one side of the common plane containing fixed axes.

Cutting Machine

2,283,346. **James H. Bucknam,** Cranford, and **Lloyd W. Young,** Scotch Plains, N. J., assigned to Oxweld Acet-

(Continued on page 64)

"Production Increased"
"Better Welds Produced"
"Time Saved"
"Costs Cut"

An article for one of our Armed Forces being position-welded on a Ransome Positioner.

These are oft-repeated statements of users of Ransome Positioners.

Today, when saving time is vital, when production is the first consideration, Ransome Positioners are a necessity where any manner of shapes and forms are welded.

Ransome is prepared to study your welding problems with a view to bettering your production and cutting your costs. Write for full information.

INDUSTRIAL DIVISION
RANSOME CONCRETE MACHINERY COMPANY
Dunellen New Jersey

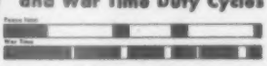
NEW AIR-COOLED Ergolyte 250F A.C. ARC WELDER SPEEDS WAR WORK

INCREASES DUTY CYCLE

War time welding is a continuous operation that doesn't allow for "cooling down" time. To meet this increased war-time duty cycle, we've developed the Ergolyte air-cooled 250 F. Because of its built-in forced-draft cooling system and extra-heavy insulation, this machine will stand the gaff 24 hours a day, 7 days a week. For complete information, write for Bulletin WE 104.

It Has Everything
Current range, 15-250 Amps.
Input Voltage, 230-460 Volts
Frequency, 60 Cycles
Phase—Operates on single phase or one phase of 2 or 3 phase current. Electrode Size Range 1/16" to 3/16"

Compare These Peace and War Time Duty Cycles



Black area indicates percentage of hour devoted to actual welding. White space shows amount of time used for slag removal, work positioning and "cooling down".

ERGOLYTE
MANUFACTURING CO.
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ELECTRODE manufacturers meet operators' demands for uniform coatings more easily when PQ Silicate is used as the binder. Today's popular rods are bound with PQ Silicates. They add strength to the cement, and keep slag loss at a minimum.

Submit your coating problem to PQ. Our Technical Department has wide experience adapting silicates to various formulas and can be helpful with your special coating requirements.

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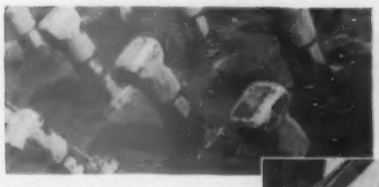
SILICATE OF SODA *SPECIALISTS*

STOODY
Hard-Facing Rods
CUT OPERATING COSTS
and conserve repair parts supplies

Whether you are constructing an airport, rolling steel, deepening a canal, mining coal, or making cement, you can eliminate a number of shutdowns and at the same time conserve vital steel supplies by hard-facing wearing surfaces of your equipment with one or more of the 14 Stoody alloys.

These metals, because of their hardness, abrasion resistance, and other properties, form protective coatings that reduce wear to an absolute minimum. It is not uncommon for equipment hard-faced with the proper type of Stoody alloy to deliver three times longer service than equipment that is not protected and in many cases the rate is even higher. For maximum service new parts should be hard-faced before they are placed in service and rehard-faced as soon as the original deposit wears away, but worn parts may also be restored to their original usefulness by welding and hard-facing.

HERE ARE TYPICAL EXAMPLES WHERE STOODY ALLOYS ARE BEING USED TO AID THE VICTORY PROGRAM



⇦ 1. These hard-faced sheepsfoot tampers lasted as long as four unprotected sets of tampers, eliminating three shutdowns and saving $1,150.00 worth of replacement parts.

2. An Oklahoma Portland Cement Company formerly changed lips on their clam shell buckets every six months. Hard-facing the wearing surfaces of the lips with Stoodite has increased bucket lip life to five years, saving more than $2,500.00 in repair parts and eliminating nine maintenance jobs. ⇨

There is a Stoody rod for every type of abrasive wear.

STOODY SELF-HARDENING for hard-facing tractor parts, crushing equipment, conveyor buckets, pump parts, muckers, tool joints, etc. • STOODITE for hard-facing steel mill equipment, plow shares, mill hammers, logging equipment, mud pump valves, etc. • STOODY 6 for hard-facing dies, high temperature—high pressure steam valves, valve seats, etc. • SILFRAM for hard-facing knuckle joints, chemical equipment, shear blades, etc. • THE NUMBERED STOODITES for hard-facing cutting tools, arbors, hot punches, gauges, etc. • STOODEX for hard-facing moldboards, thrust washers, expeller parts, etc. • STOODY A. C. for hard-facing by alternating current machines. *The foregoing metals are available on priorities of A-1-j or higher.*

STOODY SELF-HARDENING K—used interchangeably with Stoody Self-Hardening • STOODITE K—used interchangeably with Stoodite • TUBE BORIUM for hard-facing rotary drilling tools, grader blades, scarifier teeth, muller plows, etc. • BOROD for hard-facing coal cutter bits, pug mill knives, mine skips, centerless grinder rests, etc.
These rods are available on A-10 priority.

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STOODY COMPANY *Hard Facing Alloys*

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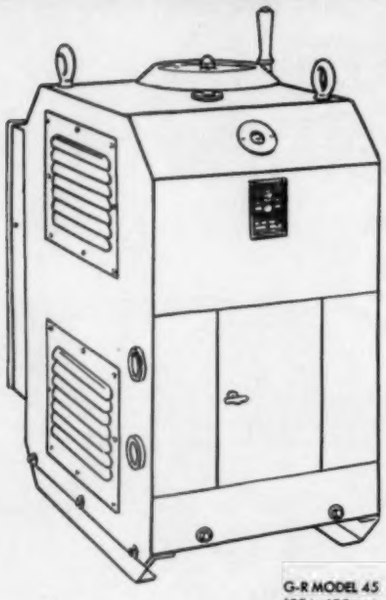

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100 to 625 amp
range. It's tops!

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- **speed.** Perfect heat control permits precision work at higher amperages. No magnetic blow.
- **safety.** G-R transformer design safeguards the operator.
- **remote control**...from floor or welding tongs.
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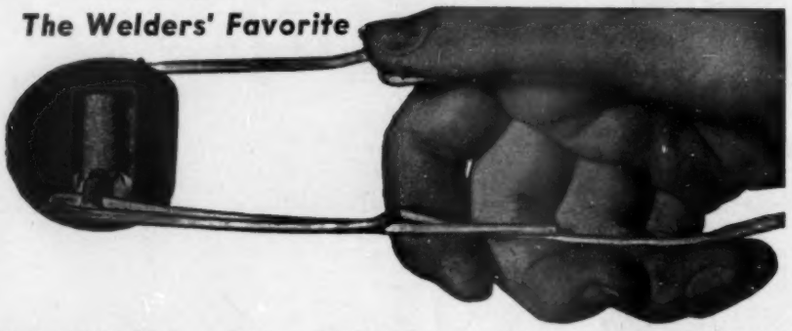
The Welders' Favorite



This renewal box is handy, saves time. Contains six Renewals.

Many superior design and construction features combine to make the improved "Round File" the most efficient and economical torch lighter.

An unusually large file area (approx. one sq. inch) is provided. The file is of superior quality, hardened in our own factory. Spark metal is of large diameter and the patented cartridge holding the metal locks exactly into position, permitting instant replacement. *Send for descriptive folders and prices.*

We also manufacture the dependable low-priced PYRO Lighter (flat-file type). Details on request.

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To insure success in welding aluminum, aluminum alloys and Dow metal, use FLUXINE No. 7, which meets Air Corps, Army and Navy "specs". Widely used for aircraft parts. It dissolves and floats off oxide coating on metals and rods. Induces fusion at the weld, speeds flow of rod, eliminates porosity, strengthens joint, leaves surface smooth. KREMBS AND CO., 671 W. Ohio St., Chicago, Ill. Chemists and metallurgists since 1875.

FLUXINE

TRADE MARK REGISTERED U.S. PATENT OFFICE

Recent Patents

(Continued from page 62)

ylene Co. Filed April 26, 1940. Issued May 19, 1942. Blowpipe apparatus adjustable for cutting work of any desired cross-sectional shape, which comprises a cutting torch having a nozzle; a holder for said torch; mechanism for supporting and moving holder and torch in a fixed plane extending transversely of the work to be cut while moving nozzle in a path which substantially follows the contour of the work surface. This mechanism comprising of a pair of crank arms swingable about parallel axes; a link connecting crank arms and carrying holder, the length of link being adjustable to change the angular relation between crank arms; gears of equal diameter operatively connectible with each crank arm; a rack meshing with both gears; and means for reciprocating said rack for moving said nozzle in said path; the arrangement being such that when said link is adjusted so that its length is equal to the distance between said axes and both of said gears are operatively connected to said crank arms, movement of said rack causes the mechanism to move said nozzle in an arcuate path to follow an arcuate work surface, and, when said link is adjusted so that its length is less than the distance between said axes and only one of said gears is connected to its crank arm, movement of said rack causes the mechanism to move said nozzle in a flat path to follow a flat work surface.

» «

Portable Tool Carriage

2,283,347. **Lloyd W. Young,** Scotch Plains, N. J., assigned to Oxweld Acetylene Co. Filed March 22, 1941. Issued May 19, 1942. A carriage for supporting, propelling and guiding a tool (e. g., a torch) relatively to a workpiece, such carriage comprising, in combination, a supporting and propelling unit including a traction wheel and mechanism for rotating the wheel; a supporting and guiding unit including at least one wheel for guiding the carriage along a desired path; and a connecting member secured to both such units and holding them spaced apart, said member and said units being so constructed and arranged that each unit is adjustable along, and removable from and replaceable on said member independently of the other unit, and each unit may be rigidly from about 1 to about 100 parts of the primary accelerator to each part of the secondary accelerator.

» «

Electric Welding Mechanism

2,283,826. **John D. Soehner,** Valley Stream, N. Y., assigned to Metropolitan Device Corp., Brooklyn, N. Y. Filed June 3, 1939. Issued May 19, 1942. In a machine of the kind described, the combination comprising two elements relatively movable between inoperative and operative positions, pneu-

matically operative means for effecting relative movement of the elements, and control means therefor including a valve for controlling the flow of fluid thereto, manually operative control means for controlling the operation of said valve, cut-out means automatically operative on operation of said valve in a direction to effect movement of the elements to operative position, said cut-out means upon operation rendering said manually operative control means ineffective for affecting said valve, and means for maintaining said cut-out means operative during a definite time interval.

» «

Electrode Holder

2,283,162. **Philip Bourque,** Detroit, Mich., assignor to Bordon Mfg. Co., Inc., Detroit, Mich. Filed Oct. 17, 1940. Issued May, 19, 1942. In an electrode holder of the class described a pair of resilient clamping jaws in superimposed relation and secured together adjacent their rear ends and springable apart at their forward ends for the reception of an electrode wire to be clamped therebetween, one of said jaws having an opening formed therein intermediate its ends; a lever projected at one end through said opening; a force applying portion on said end of said lever extended beyond the area of said opening and engageable with said opening-bearing jaw for applying force thereto; a threaded fulcrum-forming member threaded through the other of said jaws and engageable with said lever rearwardly of said force-applying portion, for, upon rocking of the same in one direction, providing an adjustable fulcrum therefor and delivering a thrust to the other of said jaws.

» «

Welding Flux

2,282,175. **Roy W. Emerson,** Wilkinsburg, Pa., assigned to Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. Filed Nov. 4, 1939. Issued May 5, 1942. A powdered exothermic fluxing material for use in metallic arc welding comprising, finely divided particles of iron oxide, aluminum in an amount sufficent to completely reduce the iron oxide, an alkaline earth metal compound for lowering the melting point of the resultant aluminate slag, and an additional deoxidizing agent for the weld metal.

» «

Welding Torch

2,283,567. **James Barton Nealey,** Wilton, Conn. Filed June 25, 1940. Issued May 19, 1942. A one piece mixing unit for the conduit of a torch or like comprising a perforated base plate having a central opening and a central perforated extension closed at one end and extending from the base plate in the direction of the flow of a combustible mixture of commingled gases so that the mixture passing through the mixing unit will be caused to pass through the perforations in the base plate and central extension and impinge upon one another, the perforations formed in the base plate being larger in diameter than those formed in the extension but less in number so that the volume of the mixture passing through the base plate will approximate the volume of the mixture passing through the extension, and means on the base plate for securing the same to the conduit of the torch.

» «

Flux

2,281,910. **Jerome Milton Bialosky** and **Menahem Merlub-Sobel,** Cleveland Heights, Ohio, assignors to William L. Ulmer, Cleveland, Ohio. Filed April 13, 1940. Issued May 5, 1942. A liquid for entrainment by gas to be delivered to a torch containing from 15% to 80% methyl borate, with the remainder one or more liquids which are physically and chemically compatible with said borate, said last-named liquid or liquids selected from the group consisting of ethers, ketones and esters and containing substantially less than 50% oxygen.

Welding Work Positioner

2,283,140. **George F. Johnston,** Elm Grove, Wis., assigned to Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Filed Feb. 28, 1941. Issued May 12, 1942. In a device for positioning a structure to be welded, a horizontal axle, a frame mounted on said axle for movement thereabout, power driven means for tilting said frame about said axle, an electrically conductive king-pin power rotatably mounted on said frame, a table mounted in electrically driven means for rotating said table in either direction and to any extent, current carrying contact means mounted on said frame and slidably engaging said king-pin, and an electrically conductive cable connecting said contact means with ground whereby substantially the entire welding current passes to ground directly through the structure to be welded, said table,

(Continued on page 66)

Saved: month's loss on A-1-a orders

2-ton Section of 100" Boring Mill Goes Back on Job After Speedy "997" Repair Weld—Only 39 Man Hours for Chipping, Grinding and Welding

Score another production victory for repair welding. This huge section for a boring mill working exclusively on A-1-a priority business was "down" for an unusually short time, despite its severe damage.

The Hebeler Welding Company of Buffalo, repair welding specialists, provided the way to give our war program the use of this mill with a minimum delay . . . repair welding with Anaconda 997 Low Fuming Rod.

75 pounds of this bronze welding rod were used, 600 feet of air and gas were consumed and 39 man hours required for the chipping and welding which put the mill in shape for active service.

4396A

For vital jobs like this one, Anaconda 997 Low Fuming Welding Rod, Tobin Bronze and other Anaconda Welding Rods are always "on call".

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One Paper Can Do More Good Damage Than 1000 Three-Inch Shells!

Join THE AMERICAN WELDING SOCIETY

It's obvious, if you stop to think. One technical paper . . . on new developments in the art of welding as applied to munitions . . . may do more ultimate damage to the enemy than thousands of high explosive shells.

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Here's what the Society and its 5200 members offer you in 1942:

1. **An opportunity to meet and talk with leaders of the welding industry at monthly Section meetings, and at other regional and national meetings.**
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J. D. TEBBEN, Chairman Membership Committee
THE AMERICAN WELDING SOCIETY
33 West Thirty-Ninth Street,
New York, N. Y.

Recent Patents

(Continued from page 65)

said king-pin, said contact means and said cable.

» «

Method of Electric Welding

2,281,805. **Eduard Schenk,** Oakdale, Pa. Filed April 28, 1941. Issued May 5, 1942. The method of welding which comprises so placing two metal members that their areas to be joined are in proximity to one another but spaced apart for the reception of filler metal, placing a metallic filler at said areas and directing a flow of alternating electrical current across said areas, from a pair of electrodes positioned against one face of the said members, at opposite sides of the space to be filled and in proximity to the adjacent edges of said areas, and through a similar pair of relatively-spaced electrodes disposed against the opposite face of said members and at the adjacent edges of said areas, the current flow across the said areas being always in the same direction at any given instant and maintained until the said areas and the filler metal become soft, the current frequency being such that there is magnetic concentration of current flow between the areas to be joined.

» «

Resistance Welding Electrode and Method

2,282,186. **Philip E. Henninger,** Pittsburgh, Pa., assigned to Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. Filed Mar. 2, 1940. Issued May 5, 1942. A spot welding electrode comprising, a body member of relatively high conductivity having an opening therethrough from the lower end to provide a passage for a

(Continued on page 68)

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Standardized by leading manufacturers for:

Salvaging of Defective Castings in cast iron, malleable steel, bronze, brass, nickel, aluminum, etc. Faster Production of fabricated parts in steel, stainless, chrome-moly, non-ferrous, aluminum and for salvaging tools.

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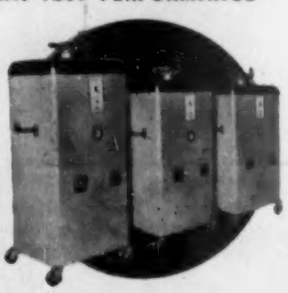
Herco A.C. Arc Welder
PRECISION CONTROL
STREAMLINED ARC
X-RAY-TEST PERFORMANCE



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Electric & Mfg. Co., Inc.
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Brooklyn, N. Y.

Variable core permits exact heat. Lower power cost. 24 hour operation. Larger electrodes — higher speed. Lower production cost.

Models from 150 to 1500 Amps.

METAL BOND PRODUCTS FOR WELDING AND SOLDERING

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BERGSTROM *Free Flowing*
HARD SURFACING ELECTRODES

"OUR welders are pleased with Bergstrom Ranalloy because in running the rods no scale is formed and it is not necessary to brush or chip before applying additional beads, which saves considerable time in labor."

"The free flowing rod has proved very successful for repairs on heavy machinery where tough and difficult conditions are encountered."

"It has been our practice to build up chain each year, but with Bergstrom Ranalloy we figure to get two seasons or more without rebuilding."

These comments are typical of many received from enthusiastic users. Have you tried Bergstrom Electrodes? If not, call Scully for them now. Available in six types—to suit practically every requirement for abrasion and corrosion resistance.

For STEEL, STEEL PRODUCTS, TOOLS, EQUIPMENT, MACHINERY *"Call Scully"*

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UNITED STATES STEEL

Simultaneous Clamping

AT MORE THAN ONE POINT

One clamping operation can now hold several pieces at one time regardless of thickness or shape. A new model Knu-Vise Toggle-Action Clamp (No. KV-195) makes this possible. Its U-shaped toggle arm permits the quick insertion and adjustment—horizontally or vertically—of pressure pads at one or more points. The same setup remains uniformly fixed for entire job. Many motions are thus eliminated, and much time is saved. One flip of lever either clamps or releases. Applied pressure ratio is in excess of 40 to 1.

If you have any clamping operations, perhaps we can show you some shortcuts to save time and speed production.

KNU-VISE INCORPORATED

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Glendale, Calif.

Upp and Adam

—By Mason and Hahn

SAY ADAM WE BETTER TRY THIS EUREKA TOOL STEEL WELDING ROD— IT'LL HELP UNCLE SAM
WHAT AM I— A BOY SCOUT OR SUMPIN'?
MAYBE NOT BUT YOU'LL BE SCOUTIN' AROUND FOR A NEW JOB IF YOU THROW AWAY DIES
YEAH? ABOUT ALL YOU SAVE AROUND HERE IS YOUR STRENGTH
WELL GEE I SAVE ALL I CAN—DON'T I?
Copyright, 1942 by Mason-Hahn
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HELP US PUSH THIS THRU
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This year farmers are going to plant, grow and harvest all their soil will bear. But they'll have to rely on what machinery they have. You can help them make it last longer and work harder by hardfacing—with BINGROD. Its toughness will prove to more farmers the value of hardfacing to make equipment last longer.

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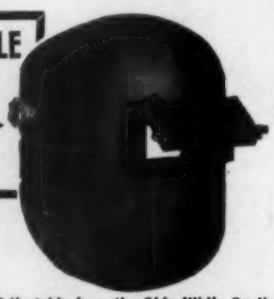
ADJUSTABLE FROM THE SIDE AT THIS POINT → WHILE ON THE HEAD!



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No. 406
HELMET

The Only Helmet Adjustable from the Side While On the Head! Has a soft, sponge rubber cushioned headband with adjustable chin rest. 3 models.

No. 406 Helmet has standard glass holder without lift-front feature.

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Recent Patents

(Continued from page 66)

cooling fluid and a relatively large substantially flat contact surface at the lower end, and a contact tip of molybdenum positioned in the opening with one end exposed to the cooling fluid and having the other end projecting from the contact surface of the body member which provides a shield a predetermined distance from the projecting end of the tip for engaging a relatively large area of a member being welded to prevent excessive penetration of the tip into the member being welded.

A method of resistance welding members which consists in initially applying current and pressure to a relatively small area of the members to be welded by means of electrodes at least one of which has a high resistance tip of relatively small area, and subsequently abruptly transferring the flow of current and the pressure from the high resistance tip to a surrounding relatively large area low resistance portion of said one electrode to limit the penetration of the said tip.

» «

Metal Spray Gun

2,282,214. **Frans O. Albertson,** Sioux City, Iowa, assignor to Albertson & Co., Inc., Sioux City, Iowa. Filed July 6, 1937. Issued May 5, 1942. In a metal spray gun, the combination of a metal body provided with a metal well, an air nozzle carried by body, a source of heat for said body comprising an electric heating element, thermostatic means for controlling said heating element, and means tending to cool said thermostatic means when the gun is operated, said thermostatic means being effective at one temperature during the operation of the metal spray gun, and at another temperature when the gun is hot but not operating.

» «

Welding Apparatus

2,282,031. **James T. Catlett,** Scotia, N. Y., assignor to General Electric Co. Filed Jan. 27, 1940. Issued May 5, 1940. A welding torch comprising a plurality of identical means for holding and feeding electrodes, means for interchangeably supporting said electrode holding and feeding means along a line of welding in any one of a plurality of spaced positions greater in number than the number of said electrode holding and feeding means, a motor for each of said electrodes holding and feeding means, and unitary means comprising a plurality of transmissions for connecting groups of said motors mounted on said unitary means with groups of said electrode holding and feeding means located in adjacent positions in their said supporting means.

» «

Apparatus For Charging Acetylene Cylinders

2,282,346. **Stephan Stark,** Grunwald, near Munich, Bavaria, Germany. Filed Aug. 31, 1938. Issued May 12, 1942. Apparatus for charging cylinders for dissolved acetylene which comprises means for supplying compressed acetylene at a pressure exceeding that of the cylinders to be charged; a vaporizer having a passage for conducting the compressed acetylene therethrough, said passage having relatively narrow successive cross sectional areas; means for injecting acetone into said passage in a finely divided state; a cylinder charging rack; means for conducting vapor-bearing acetylene from said vaporizer to said rack; and means for preventing acetone in the liquid state from flowing to the cylinders.

» «

Direct Current Negative Carbon Electrode

2,282,533. **Russell W. Simon** and **William W. Lozier,** Fostoria, Ohio, assigned to National Carbon Co., Inc. Filed May 8, 1940. Issued May 12, 1942. An "anti-carbide tip" negative electrode for a direct current carbon arc, comprising a hollow shell predominantly consisting of carbon and containing an arc-supporting material of an alkali metal salt intimately and uniformly dispersed therein, said arc-supporting material constituting an amount not substantially greater than about 5% by weight of the total shell composition.

» «

Electric Welding

2,282,522. **John A. Kratz,** Bronxville, N. Y., assigned to The Linde Air Products Co. Filed July 6, 1940. Issued May 12, 1942. An electric welding system comprising, in combination, a welding circuit including a movable electrode and the work, electrically operable means for advancing said electrode toward the work, said means receiving energy solely from said welding circuit; and a control device, operable to establish the flow of current to said means only when the welding voltage exceeds a pre-selected value.

» «

Method of Seam Welding

2,282,032. **James T. Catlett,** Scotia, N. Y., assigned to General Electric Co. Filed Jan. 27, 1940. Issued May 5, 1942. The method of seam welding which comprises progressively applying heat along a Y seam as rapidly as possible until the leading end of an elongated pool of molten metal begins to form in the seam, then at a less rapid rate to transmit heat through said pool of molten metal until the non-molten edges of said seam below said pool have been raised to a forge welding temperature, and finally at a still less rapid rate which permits the trailing end of said pool to solidify from its bottom upwardly and while thus applying heat applying a side pressure to said seam which progressively brings opposed surfaces at its bottom into engagement with one another before the formation of said pool, then completes a forge weld between said bottom surfaces with sufficient deformation of the seam edges to fill the top portion of said seam with said molten metal and finally holds said seam securely during the

(Continued on page 70)

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Recent Patents

(Concluded from page 68)

time necessary for the welded portions to become strong enough to withstand the stresses resulting from the welding operation.

» «

Method for Butt-Welding Pipes and Tubing

2,282,508. **James L. Anderson,** Closter, N. J., assigned to Air Reduction Co., Inc., New York, N. Y. Filed Jan. 27, 1940. Issued May 12, 1942. The method of welding together the ends of tubes which comprises holding the tubes stationary with their end faces spaced apart but confronting one another, heating the end faces simultaneously by heating flames projected directly against the surfaces of the end faces around their circumferences moving the tubes toward one another, heating both end faces substantially equally during the time that they are coming together, pressing the end faces of the tubes into contact with one another to weld them together, and continuing to project heating flames against the tubes after the end faces are in contact to smooth any molten metal squeezed out from between the faces.

» «

Flame Hardening Process and Apparatus

2,282,670. **Robert Baxter Mitchell,** Milwaukee, Wis., assigned to Harnischfeger Corp., Milwaukee, Wis. Filed Sept. 15, 1941. Issued May 12, 1942. The method of hardening a path on the surface of an object formed of a quench-hardenable material, which consists in applying a pair of heat sources in side-by-side relation to a medial part of the path to be treated and then moving said sources away from one another along said path at such rates as to raise the temperature of surface layers in said path to hardening temperature, then while said movement of said heat sources is taking place and when the same have separated a predetermined distance impinging quenching fluid from a pair of separable quenching fluid sources upon the initially heated portion of said path to quench the same, dividing said quenching fluid sources while continuing the supply of fluid therethrough by causing the safe to move away from one another, one each to follow one of said heat sources at a predetermined spacing behind the same, continuing said movements until all portions of said path have been raised to hardening temperature, and then removing said heat sources and continuing the movement of said quenching fluid sources until all heated portions have been quenched.

» «

Flame Hardening

2,282,942. **John J. Crowe,** Westfield, N. J., assigned to Air Reduction Co., Inc., New York. Filed April 2, 1940. Issued May 2, 1942. The method of flame hardening a metal work-piece, which method comprises heating a section of the work-piece above its critical temperature by applying intense heat to the surface of that section with a number of separate heat sources, starting the operation of some of said heat sources ahead of others to apply heat for longer periods to regions where the mass of the work-piece is heavier than at other regions, and quenching the work-piece while it is heated above its critical temperature.

» «

Electric Welding

2,282,339. **John H. Murch,** East Orange, N. J., assigned to American Can Co., New York, N. Y. Filed April 20, 1940. Issued May 12, 1942. In a machine for simultaneously welding separate can bodies and the like, the combination of a horn for supporting a plurality of can bodies to be welded, each of said bodies having contacting areas constituting body side seams, means for moving said cam bodies in a continuous procession along said horn with their side seams following a predetermined path of travel, a welding device comprising a double pair of electrodes arranged inside and outside of said horn respectively and in the path of travel of the said side seams, and means for producing relative motion between the inner and the outer of said electrodes for a welding operation to simultaneously tack weld spaced seam areas of separate can bodies.

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